CHAPTER IV - SUMMARY OF TROPICAL CYCLONES

1. GENERAL RESUME

a. WESTERN NORTH PACIFIC

1975 saw a sharp decrease in tropical cyclone activity from last season (Table 4-1). There were only 20 named tropical cyclones in 1975, a 30% decrease from the long-term average of 28.6 (Table 4-2). Since 1945, only 1973 exceeds 1975 for total number of consecutive days without a named tropical cyclone. The record in 1973 was 183 consecutive days, while in 1975 180 days elapsed between Typhoon Lola in January and Tropical Storm Mamie in July. Of the 20 named tropical storms occurring between 27 July and 24 November, thirteen became typhoons. Three of these, Nina, Elsie and June became super typhoons with maximum winds exceeding 130 kt. The most noteworthy event of the 1975 season was the occurrence of Super Typhoon June, the most intense tropical cyclone ever recorded. Table 4-3 depicts the distribution of typhoons by month and year.

TABLE 4-1. 1975 TROPICAL CYCLONES

PACIFIC AREA

CYCLONE	TYPE	NAME	PRD OF WRNG	CALENDAR DAYS OF WARNING	MAX SFC WIND	MIN OBS SLP	NO. OF WARNINGS TOTAL	WARNINGS AS TY	DISTANCE TRAVELED
01	TY	LOLA	22 JAN-28 JAN	7	70	976	25	3	1800
02	TD	---	23 APR-28 APR	6	25	004	19	---	605
03	TS	MAMIE	27 JUL-29 JUL	3	40	994	10	---	774
04	TY	NINA	31 JUL-04 AUG	5	135	904	15	8	1084
05	TD	---	06 AUG-07 AUG	2	30	---	4	---	293
06	TY	ORA	10 AUG-12 AUG	3	65	976	10	4	630
07	TY	PHYLLIS	12 AUG-18 AUG	7	120	920	27	15	1622
08	TY	RITA	18 AUG-23 AUG	6	80	966	23	7	1465
09	TS	SUSAN	*	6	50	---	19	---	816
10	TY	TESS	02 SEP-10 SEP	9	95	945	33	22	1613
11	TS	VIOLA	05 SEP-07 SEP	3	45	996	10	---	416
12	TY	WINNIE	09 SEP-12 SEP	4	65	---	13	4	1188
13	TY	ALICE	16 SEP-20 SEP	5	75	971	18	5	1316
14	TY	BETTY	17 SEP-23 SEP	7	95	944	26	11	1785
15	TY	CORA	01 OCT-06 OCT	6	105	943	21	11	2376
16	TS	DORIS	03 OCT-06 OCT	4	55	---	10	---	470
17	TY	ELSIE	09 OCT-15 OCT	7	135	900	25	14	1656
18	TD	---	15 OCT-17 OCT	3	30	002	8	---	432
19	TY	FLOSSIE	20 OCT-23 OCT	4	70	977	15	4	798
20	TS	GRACE	25 OCT-02 NOV	8	60	994	29	---	1940
21	TS	HELEN	03 NOV-04 NOV	2	45	998	6	---	375
22	TY	IDA	06 NOV-11 NOV	6	85	959	22	8	1865
23	TY	JUNE	16 NOV-24 NOV	9	160	876	32	25	2641
24	TD	---	27 DEC-28 DEC	2	30	---	5	---	211
25	TD	---	27 DEC-29 DEC	3	30	---	10	---	227
			1975 TOTALS	110**			435	141	

INDIAN OCEAN AREA

CYCLONE	PRD OF WRNG	CALENDAR DAYS OF WARNING	MAX SFC WIND	MIN OBS SLP	NO. OF WARNINGS TOTAL	WARNINGS AS TY	DISTANCE TRAVELED
TC 04-75	10 JAN-11 JAN	2	35	---	3	---	271
TC 24-75	02 MAY-12 MAY	11	95	---	21	12	842
TC 25-75	05 MAY-08 MAY	4	70	---	6	1	450
TC 28-75	20 OCT-22 OCT	3	80	---	4	1	180
TC 29-75	07 NOV-12 NOV	6	50	---	10	---	799
TC 33-75	25 NOV-01 DEC	7	35	---	7	---	1310
	1975 TOTALS	33**			51	14	

*SUSAN 26 AUG & 27 AUG AND 29 AUG - 01 SEP
**OVERLAPPING DAYS INCLUDED ONLY ONCE IN SUM

TABLE 4-2 FREQUENCY OF TROPICAL STORMS AND TYPHOONS BY MONTH AND YEAR

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
AVERAGE (1945-58)	0.4	0.1	0.4	0.5	0.8	1.3	3.0	3.9	4.1	3.3	2.7	1.1	22.0
1959	0	1	1	1	0	0	3	6	6	4	2	2	26
1960	0	0	0	1	1	3	3	10	3	4	1	1	27
1961	1	1	1	1	3	2	5	4	6	5	1	1	31
1962	0	1	0	1	2	0	6	7	3	5	3	2	30
1963	0	0	0	1	1	3	4	3	5	5	0	3	25
1964	0	0	0	0	2	2	7	9	7	6	6	1	40
1965	2	2	1	1	2	3	5	6	7	2	2	1	34
1966	0	0	0	1	2	1	5	8	7	3	2	1	30
1967	1	0	2	1	1	1	6	8	7	4	3	1	35
1968	0	0	0	1	1	1	3	8	3	6	4	0	27
1969	1	0	1	1	0	0	3	4	3	3	2	1	19
1970	0	1	0	0	0	2	2	6	4	5	4	0	24
1971	1	0	1	3	4	2	8	4	6	4	2	0	35
1972	1	0	0	0	1	3	6	5	4	5	2	3	30
1973	0	0	0	0	0	0	7	5	2	4	3	0	21
1974	1	0	1	1	1	4	4	5	5	4	4	2	32
1975	1	0	0	0	0	0	2	4	5	5	3	0	20
AVERAGE (1959-75)	0.5	0.4	0.5	0.8	1.2	1.6	4.6	6.1	4.9	4.1	2.6	1.1	28.6

TABLE 4-3 FREQUENCY OF TYPHOONS BY MONTH AND YEAR

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
AVERAGE (1945-58)	0.4	0.1	0.3	0.4	0.7	1.1	2.0	2.9	3.2	2.4	2.0	0.9	16.3
1959	0	0	0	1	0	0	1	5	3	3	2	1	20
1960	0	0	0	1	0	2	2	8	0	4	1	1	19
1961	0	0	1	0	2	1	3	3	5	3	1	1	20
1962	0	0	0	1	2	0	5	7	2	4	3	0	24
1963	0	0	0	1	1	2	3	3	3	4	0	2	19
1964	0	0	0	0	2	2	6	3	5	3	4	1	26
1965	1	0	0	1	2	2	4	3	5	2	1	0	21
1966	0	0	0	1	2	1	3	6	4	2	0	1	20
1967	0	0	1	1	0	1	3	4	4	3	3	0	20
1968	0	0	0	1	1	1	1	4	3	5	4	0	20
1969	1	0	0	1	0	0	2	3	2	3	1	0	13
1970	0	1	0	0	0	1	0	4	2	3	1	0	12
1971	0	0	0	3	1	2	6	3	5	3	1	0	24
1972	1	0	0	0	1	1	4	4	3	4	2	2	22
1973	0	0	0	0	0	0	4	2	2	4	0	0	12
1974	0	0	0	0	1	2	1	2	3	4	2	0	15
1975	1	0	0	0	0	0	1	3	4	3	2	0	14
AVERAGE (1959-75)	0.2	0.1	0.1	0.7	0.9	1.1	2.9	3.8	3.2	3.2	1.6	0.6	18.7

Table 4-4 presents the tropical cyclone formation alert summary. Although the development rate is 74%, it is worthy of note that all 25 tropical cyclones for 1975 were preceeded by a formation alert.

There were 110 calendar days in 1975 during which warnings were issued on numbered tropical cyclones. This is well below the average of 145 warning days (Table 4-7).

During most of July, the monsoonal trough was located along 5N, south of its climatological position between 10N and 15N. The trough was masked late in the month by Tropical Storm Mamie and was reestablished near the normal summertime latitudes as Super Typhoon Nina formed in the Philippine Sea. August saw five numbered tropical cyclones. Of these, Typhoon Ora, Phyllis and Rita were spawned in the trough. Throughout September, the trough was again south of the expected long term mean position. Early October saw the return of the trough to its normal latitude, but in mid month it migrated south again, where it remained throughout November. A total of only 14 named tropical cyclones had their beginnings in the monsoonal trough during 1975.

In late July, T.S. Mamie was initiated by a cyclonic circulation in the tropical upper tropospheric trough (TUTT). The TUTT continued to play an active role, initializing T.S. Susan in August and Typhoons Winnie and Tess in September. The long term statistics show that 15% of WESTPAC tropical cyclones originate in the TUTT. This season's 16% is thus close to a climatological norm.

Various casualty reports indicate that Typhoons Phyllis and Rita accounted for the majority of tropical cyclone related casualties in Japan. Phyllis caused 60 deaths and 146 injuries in mid August. Later in the month, Rita reportedly caused the worst flooding on Hokkaido in ten years. On Taiwan, Typhoon Nina caused 25 deaths and 168 injuries, also sinking a small freighter. Typhoon Betty, in September, caused an additional 12 deaths and injuried scores. The Republic of the Philippines suffered casualties from Typhoon Lola in January and TD's 24 and 25 in December. Most deaths were caused by extensive flooding of low lying areas. Lola accounted for the loss of 30 lives and serious damage to sugar producing areas on the southern islands. TD's 24 and 25, although limited in destructive winds, caused torrential rains and 97 lives were lost in the resulting floods. The greatest at-sea disaster occurred in the South China Sea when Typhoon Flossie sank two timber freighters with the loss of 44 lives in late October.

TABLE 4-4.

PACIFIC AREA

TROPICAL CYCLONE FORMATION ALERT SUMMARY

YEAR	NUMBER OF ALERT SYSTEMS	ALERT SYSTEMS WHICH BECAME NUMBERED TROPICAL CYCLONES	TOTAL NUMBERED TROPICAL CYCLONES	DEVELOPMENT RATE
1972	41	29	32	71%
1973	26	22	23	85%
1974	35	30	36	86%
1975	34	25	25	74%

MONTHLY DISTRIBUTION

	J	F	M	A	M	J	J	A	S	O	N	D
1975	1	0	0	2	1	0	3	6	7	7	5	2

b. NORTH INDIAN OCEAN

The JTWC area of responsibility was expanded in July 1975 to include the entire area north of the equator between the Malay Peninsula and 62E.

Table 4-5 presents statistical data on the frequency of North Indian Ocean cyclones by month and year. May 1975 was an active month, with one cyclone in the Bay of Bengal and another in the Arabian Sea. Aside from this early spurt of activity the season for the North Indian Ocean was climatologically normal.

There were two cyclones in the Arabian Sea during the 1975 season. One occurred in May during the transition from the northeast to the southwest monsoon. Tropical Cyclone 24-75 formed just off the southwest tip of the Indian subcontinent. It tracked northwest and dissipated over water about 300 nm southeast of Oman. Tropical Cyclone 28-75 formed in late October, during the transition to the northeast monsoon. The storm tracked west and then veered northeast to make landfall on the northwest coast of India, with winds estimated at 65 kt.

Four tropical cyclones were recorded for the Bay of Bengal during the 1975 season. Of these, two struck the central Burma coast. Tropical Cyclone 04-75 formed 150 nm north of Sumatra and described a smoothly recurving track to central Burma, making landfall with surface winds under 34 kt. Tropical Cyclone 25-75 organized in the Andaman Sea. The storm initially tracked northwest, later recurving into central Burma with typhoon force winds. The system caused widespread damage and took approximately 80 lives.

Tropical Cyclone 29-75 formed in the south central Bay, and maintained an initial west-northwest track. The storm then curved to the northeast, passing within 50 nm of the east coast of India. The track continued northeast until the system went ashore east of Dacca on 12 November. Tropical Cyclone 33-75 formed in late November and described an erratic track in the southwest portion of the Bay. The storm dissipated over water on 1 December.

c. CENTRAL NORTH PACIFIC

During the 1975 season there were no tropical cyclones reported in the Central North Pacific. No detailed study has yet been conducted to ascertain possible causes for such inactivity, however two environmental anomolies were noted. The first was the slightly depressed sea surface temperature that prevailed over this area during most of the season. Secondly, the upper atmospheric westerly flow extended unusually far to the south. The resulting vertical shear tended to inhibit tropical cyclone development. Table 4-6 summarizes frequency of Central Pacific tropical cyclones by month and year.

TABLE 4-5. FREQUENCY OF NORTH INDIAN OCEAN CYCLONES BY MONTH AND YEAR.

YEAR*	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
1971	0	0	0	0	0	0	0	0	0	1	1	0	2
1972	0	0	0	1	0	0	0	0	2	0	1	0	4
1973	0	0	0	0	0	0	0	0	0	1	2	1	4
1974	0	0	0	0	0	0	0	0	0	0	1	0	1
1975	1	0	0	0	2	0	0	0	0	1	2	0	6
AVG**	0.1	***	0.1	0.3	0.7	0.7	0.6	0.4	0.5	1.0	1.1	0.5	5.7

*1971-1974 REPRESENT BAY OF BENGAL CYCLONES ONLY
**1877-1960 AVERAGE (INCLUDING ARABIAN SEA) MARINERS WORLDWIDE CLIMATIC GUIDE TO TROPICAL STORMS AT SEA (H.L. CRUTCHER AND R. G. QUAYLE)
***LESS THAN 0.05 PER MONTH

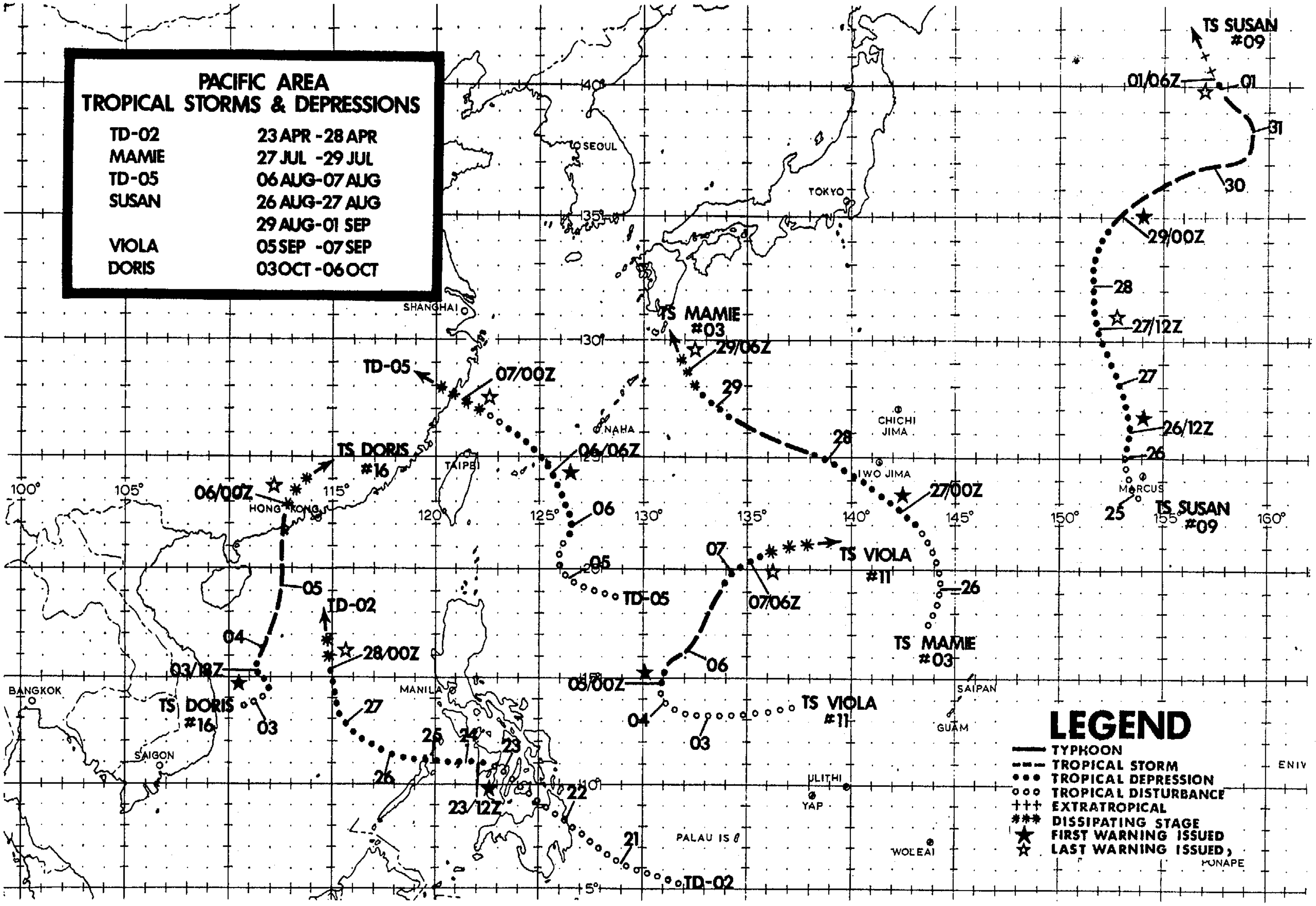
TABLE 4-6. FREQUENCY OF CENTRAL PACIFIC STORMS BY MONTH AND YEAR. (NUMBERS IN PARENTHESIS INDICATE STORMS REACHING HURRICANE INTENSITY)

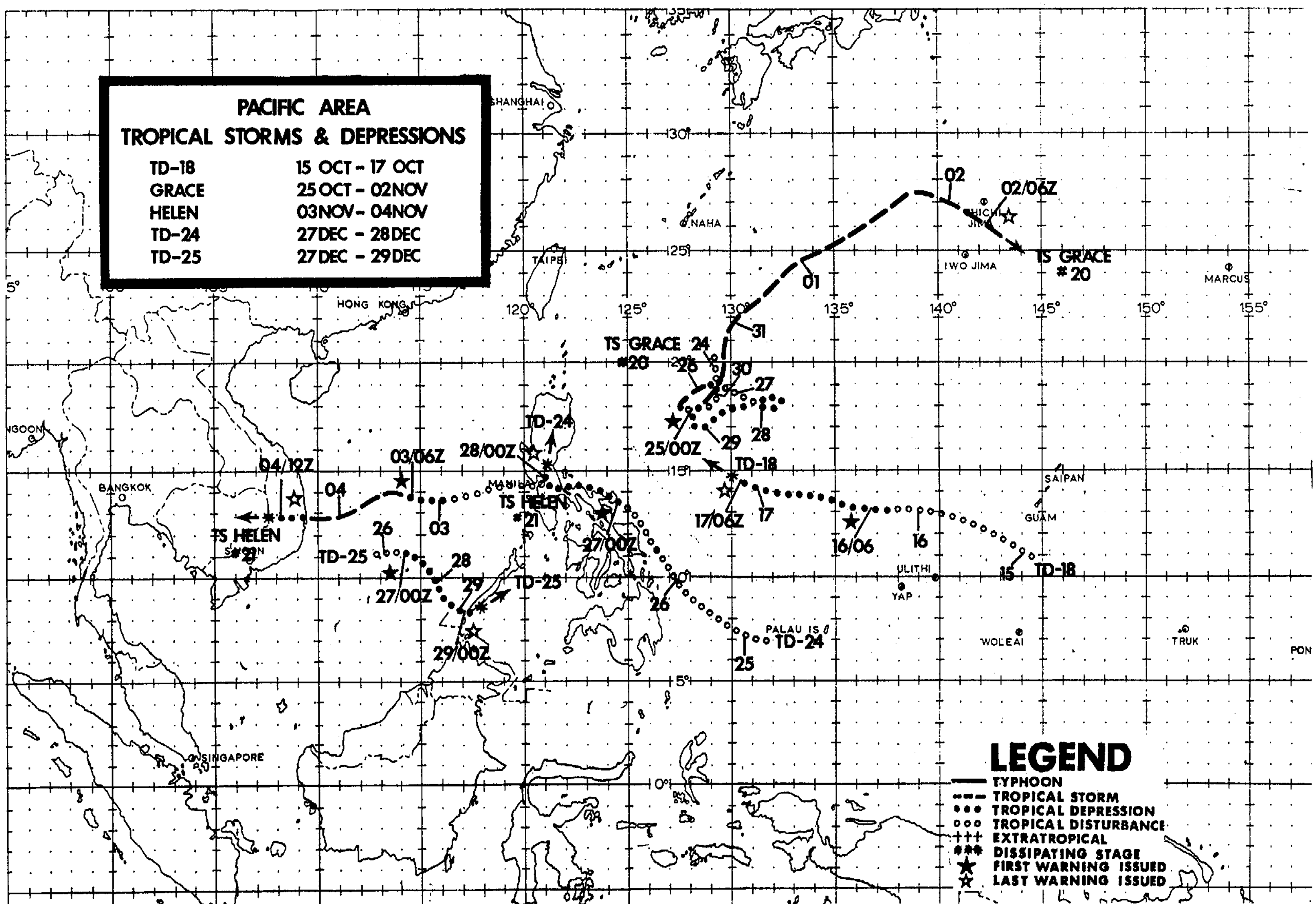
	JAN-JUN	JUL	AUG	SEP	OCT	NOV-DEC
1966	0	0	2 (1)	0	0	0
1967	0	0	0	0	1	0
1968	0	0	2	0	0	0
1969	0	0	0	0	0	0
1970	0	0	1	0	0	0
1971	0	1 (1)	1	0	0	0
1972	0	0	3 (1)	1	0	0
1973	0	1 (1)	0	0	0	0
1974	0	0	2 (1)	0	0	0
1975	0	0	0	0	0	0
AVERAGE	0	.2 (.2)	1.1 (.3)	.1	.1	0

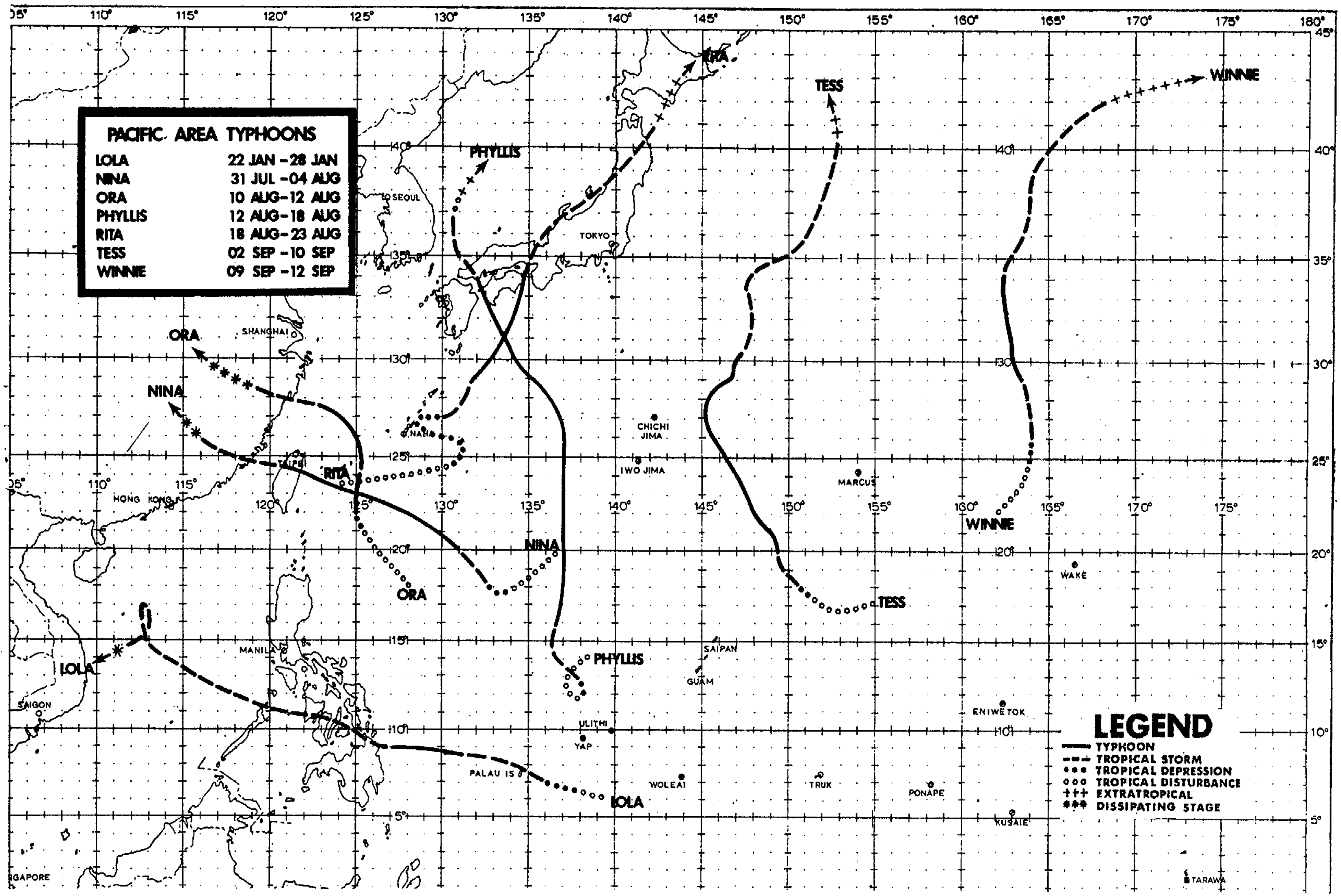
TABLE 4-7. SUMMARY OF JTWC WARNINGS 1959-1975.

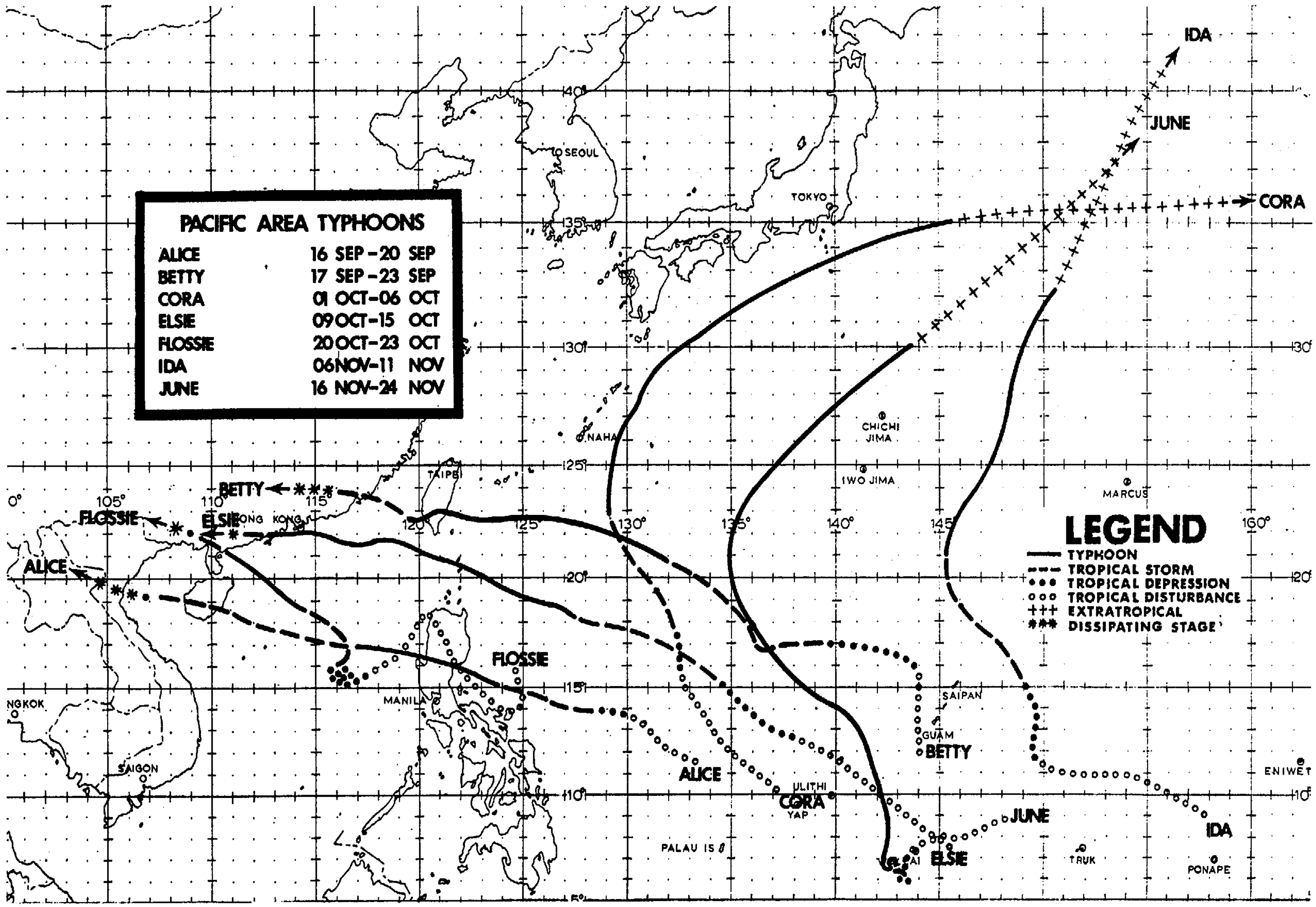
	WESTERN NORTH PACIFIC		NORTH INDIAN OCEAN		CENTRAL NORTH PACIFIC	
	1975	AVERAGE 1959-1974	1975	AVERAGE 1971-1974*	1975	AVERAGE 1970-1974
TOTAL NUMBER OF WARNINGS	435	696	51	20	0	39
CALENDAR DAYS OF WARNINGS	110	145	33	12	0	12
NUMBER OF WARNING DAYS WITH TWO CYCLONES	18	50	4	0	0	1
NUMBER OF WARNING DAYS WITH THREE OR MORE CYCLONES	0	10	0	0	0	0
TROPICAL DEPRESSIONS	5	5	--	--	0	1
TROPICAL STORMS	6	11	--	--	0	1
TYPHOONS/HURRICANES	14	19	--	--	0	1
I.O. TROPICAL CYCLONES	--	--	6	3	--	--
TOTAL TROPICAL CYCLONES	25	41	6	3	0	3

*BAY OF BENGAL ONLY (DOES NOT INCLUDE ARABIAN SEA)


PACIFIC AREA
TROPICAL STORMS & DEPRESSIONS
TD-02 23 APR - 28 APR
MAMIE 27 JUL - 29 JUL
TD-05 06 AUG - 07 AUG
SUSAN 26 AUG - 27 AUG
29 AUG - 01 SEP
VIOLA 05 SEP - 07 SEP
DORIS 03 OCT - 06 OCT
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
TS SUSAN #09
TS MAMIE #03
TD-05
TS DORIS #16
TD-02
TS VIOLA #11
SEOUL
TOKYO
SHANGHAI
NAHA
TAIPEI
CHICHI JIMA
IWO JIMA
MARCUS
HONG KONG
BANGKOK
SAIGON
MANILA
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
PONAPE
01/06Z
29/00Z
27/12Z
26/12Z
29/06Z
07/00Z
06/06Z
06/00Z
27/00Z
07/06Z
28/00Z
03/18Z
05/00Z
23/12Z
100°
105°
115°
120°
125°
130°
135°
140°
145°
150°
155°
160°


PACIFIC AREA
TROPICAL STORMS & DEPRESSIONS
TD-18 15 OCT - 17 OCT
GRACE 25 OCT - 02 NOV
HELEN 03 NOV - 04 NOV
TD-24 27 DEC - 28 DEC
TD-25 27 DEC - 29 DEC
SHANGHAI
NAHA
TAIPEI
HONG KONG
IWO JIMA
MARCUS
TS GRACE #20
02/06Z
BANGKOK
MANILA
TS HELEN #21
TS HELEN #21
04/12Z
03/06Z
28/00Z
TD-24
TD-18
17/06Z
16/06
TD-25
27/00Z
29/00Z
25/00Z
PALAU IS
ULITHI
YAP
WOLEAI
TRUK
SAIPAN
GUAM
SINGAPORE
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED


PACIFIC AREA TYPHOONS
LOLA 22 JAN - 28 JAN
NINA 31 JUL - 04 AUG
ORA 10 AUG - 12 AUG
PHYLLIS 12 AUG - 18 AUG
RITA 18 AUG - 23 AUG
TESS 02 SEP - 10 SEP
WINNIE 09 SEP - 12 SEP
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
SEOUL
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
MANILA
SAIGON
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
ENIWETOK
KUSAIE
TARAWA
LOLA
NINA
ORA
PHYLLIS
RITA
TESS
WINNIE


PACIFIC AREA TYPHOONS
ALICE 16 SEP-20 SEP
BETTY 17 SEP-23 SEP
CORA 01 OCT-06 OCT
ELSIE 09 OCT-15 OCT
FLOSSIE 20 OCT-23 OCT
IDA 06 NOV-11 NOV
JUNE 16 NOV-24 NOV
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
IDA
JUNE
CORA
SEOUL
TOKYO
NAHA
TAIPEI
HONG KONG
MANILA
SAIGON
BANGKOK
CHICHI JIMA
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FLOSSIE
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CORA
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JUNE
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105°
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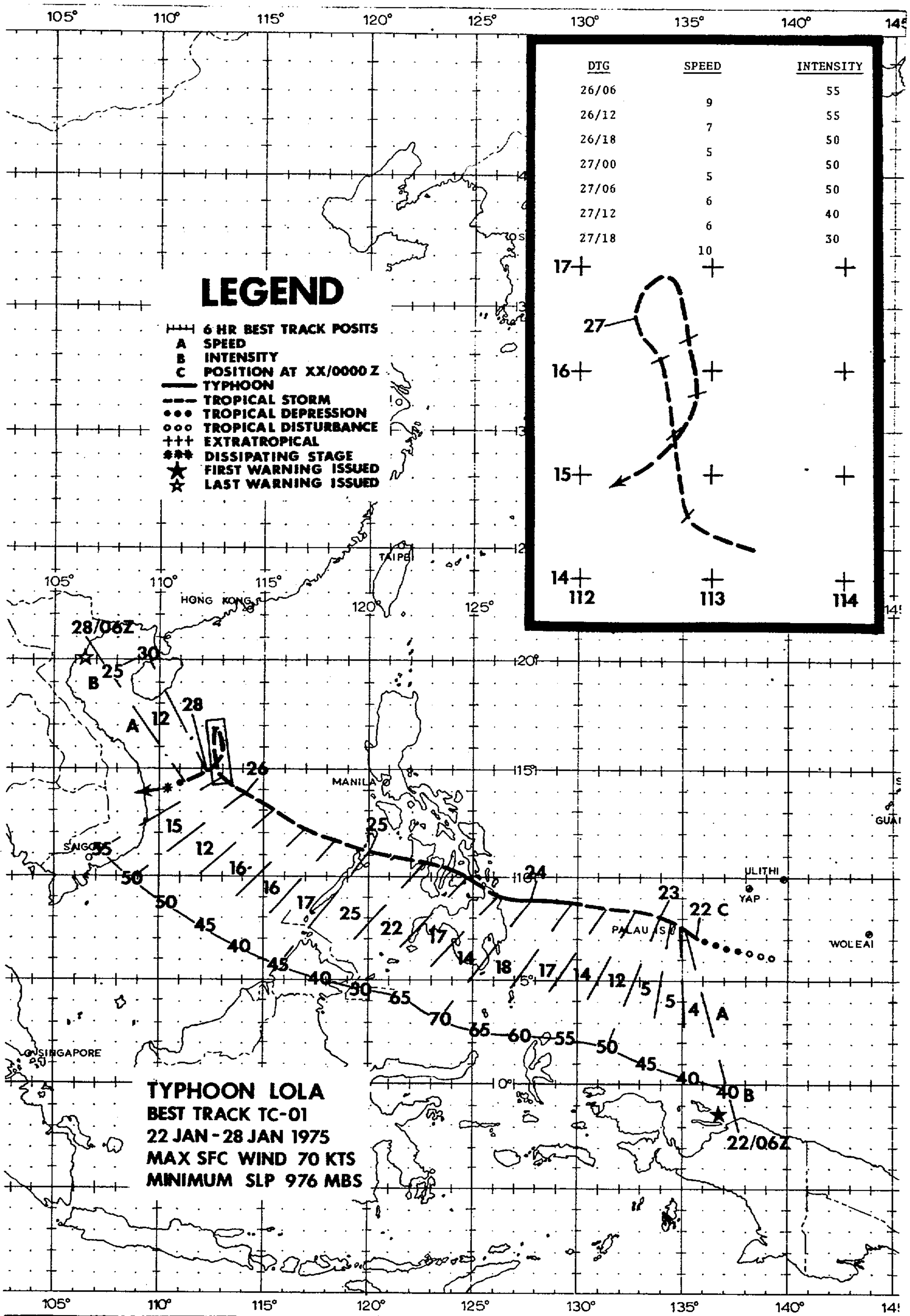
160°
40°
35°
30°
25°
20°
15°
10°
5°


LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
DTG SPEED INTENSITY
26/06 55
9
26/12 55
7
26/18 50
5
27/00 50
5
27/06 50
6
27/12 40
6
27/18 30
10
HONG KONG
MANILA
TAIPEI
SAIGON
SINGAPORE
ULITHI
YAP
PALAU IS
WOLEAI
28/06Z
22/06Z
TYPHOON LOLA
BEST TRACK TC-01
22 JAN - 28 JAN 1975
MAX SFC WIND 70 KTS
MINIMUM SLP 976 MBS

In mid-January, the monsoon trough, normally located south of 5N during this time of year, moved northward. A circulation was first detected in the trough on 18 January approximately 400 nm south of Guam. Over the next five days this tropical disturbance was to develop into Typhoon Lola. Lola was distinguished by being only the ninth typhoon in the month of January since 1945.

From its origin, the circulation tracked west-northwest as it intensified to tropical storm strength on 22 January. At that time Lola was 75 nm east of the Palau Islands with northwesterly winds of 35 kt observed on Koror. Wind, rain, and high seas from Lola lashed the Palau Islands for the next 24 hr as the storm moved through. Major damage to agriculture occurred on the northernmost island of Kayangel, with banana, papaya, coconut, and taro crops nearly totally destroyed.

From the Palau Islands, Lola tracked west under the steering influence of strong 500 mb ridging to the north. With upper-level outflow restricted in the eastern semicircle by strong ridging to the east, Lola developed to minimal typhoon strength late on the 23rd. Aircraft reconnaissance reports on the 24th indicated the typhoon's central pressure had reached its minimum of 976 mb (Fig. 4-1).

Typhoon Lola struck the central Philippines' sugar producing provinces near peak intensity on the afternoon of the 24th. At least 30 persons were reported killed by landslides and flying debris, with more than 300 houses in the coastal town of Tandog destroyed by the storm surge.

Lola decreased to tropical storm strength while crossing the Philippines and entered the South China Sea. The storm then pursued a west-northwest track as the 500 mb ridge receded eastward. Lola regenerated to a peak intensity of 50 kt on the morning of the 26th. By the following morning, a cold frontal surge from Asia pushed into the South China Sea, weakening the circulation significantly. The remains of Lola moved southward in response to the building high pressure to the north. The final warning was issued on the 28th, when satellite data indicated that the upper-level anticyclone had sheared off, and the remains of the surface circulation had drifted southward.

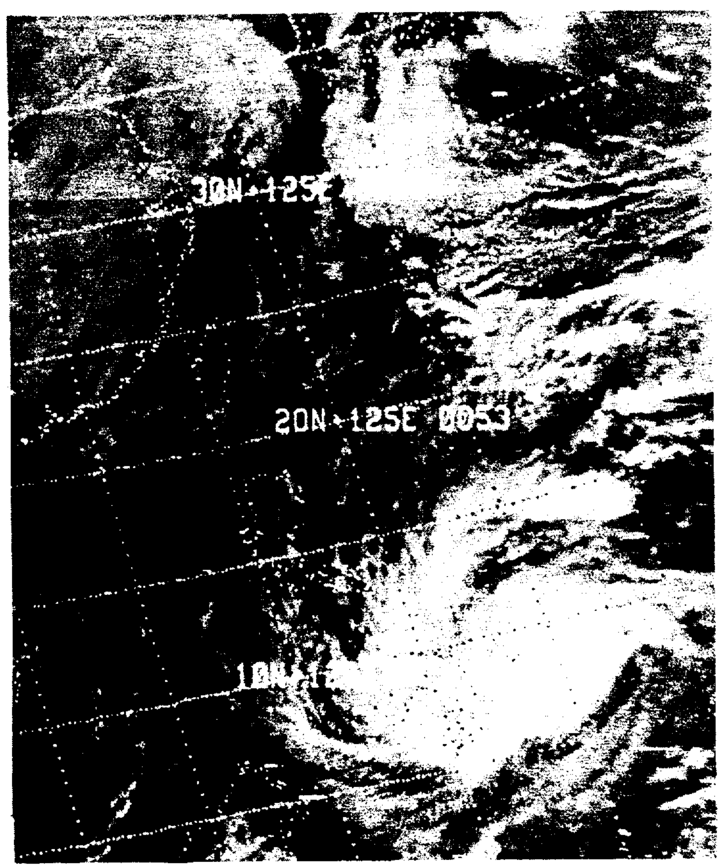
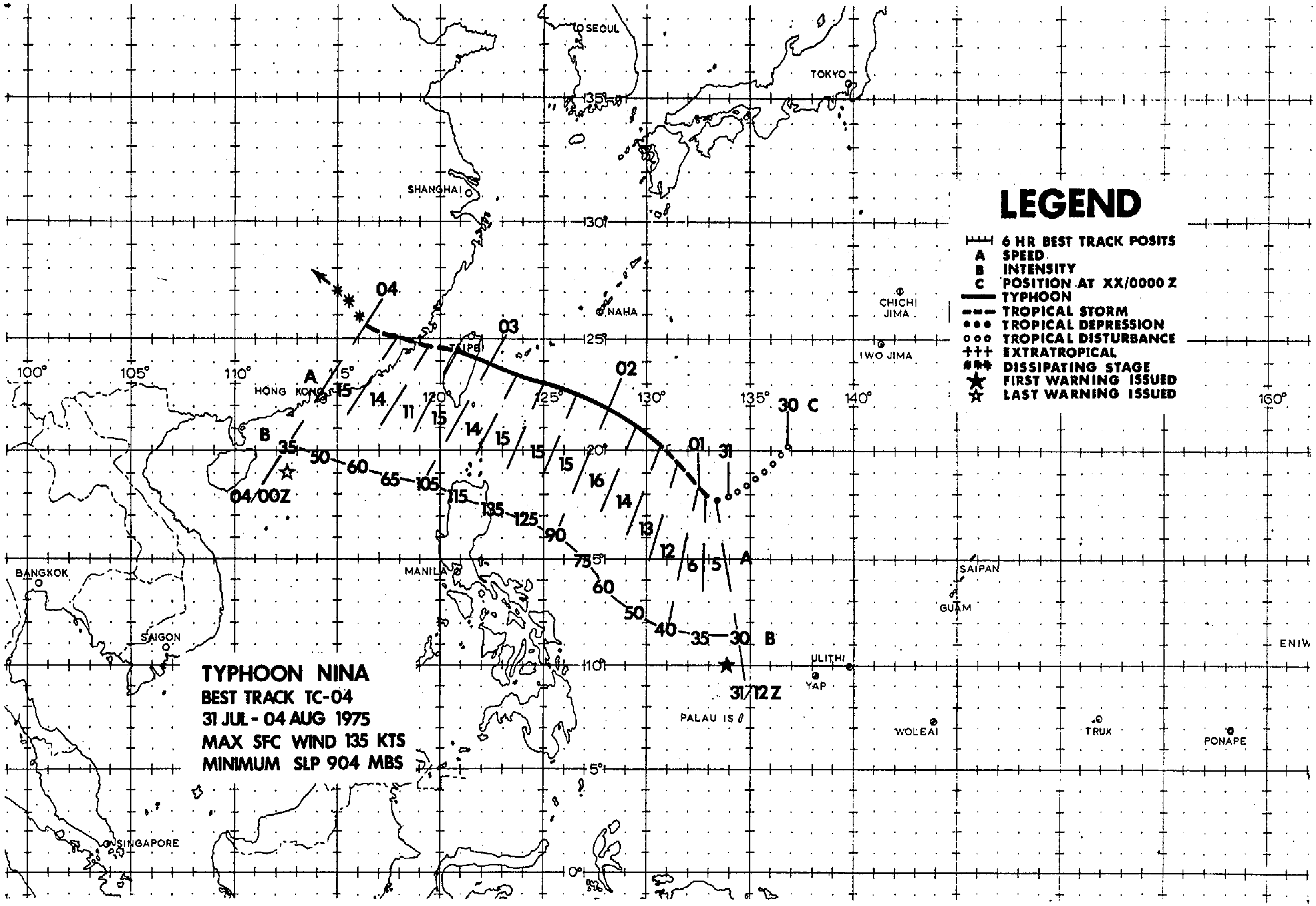


FIGURE 4-1. *Typhoon Lola near peak intensity 90 nm east of northern Mindanao, 24 January 1975, 0056Z. (NOAA-4 imagery)*


TYPHOON NINA
BEST TRACK TC-04
31 JUL - 04 AUG 1975
MAX SFC WIND 135 KTS
MINIMUM SLP 904 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SEOUL
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
CHICHI JIMA
IWO JIMA
MANILA
BANGKOK
SAIGON
SINGAPORE
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
ENIW
04/00Z
31/12Z

As Tropical Storm Mamie dissipated and drifted toward Korea, the monsoon trough migrated northward leaving a well-defined trough line extending southeastward from the remains of Mamie into the Philippine Sea. A tropical disturbance spawned in this trough near 20N 137E on 29 July and rapidly developed into Typhoon Nina, one of the most destructive storms of the 1975 season.

After initial detection by satellite and classification as a tropical disturbance, T.D. 04 moved southwestward for approximately 36 hr as surface and upper-air circulations became organized and vertically aligned. By 1200Z on the 31st the system slowed, intensified rapidly to tropical storm strength, and began turning to the northwest (Fig. 4-2). As the storm made this turn, it responded to mid-tropospheric steering flow and accelerated along the equatorward periphery of the 500 mb subtropical ridge. Continued building of the subtropical ridge to the west forced Nina to take a west-northwesterly track toward Taiwan just prior to reaching typhoon intensity on 1 August.

Nina underwent explosive deepening late on 1 August. Aircraft reconnaissance data indicated a 63 mb drop in sea level pressure at the typhoon center between the 1st at 1437Z and the 2nd at 0830Z, with maximum surface winds increasing from 65 kt to 130 kt during that period. An overhead pass by a DMSP satellite gave a particularly striking view of the typhoon as it was undergoing rapid deepening (Fig. 4-3). A peak intensity of 135 kt was attained on the 2nd at 1200Z, approximately 200 nm east of Taiwan. The typhoon slowly decreased in intensity while approaching the island, making landfall near the coastal city of Hualien on the 3rd at 0300Z with maximum surface winds of 100 kt.

Much of the typhoon's strength was lost as it battered across Taiwan's central mountain range, fortunately sparing the most populous areas from the more intense winds near the eye. Nevertheless, Nina's trek across Taiwan reportedly left 25 people dead, 4 missing and 168 injured. It was also reported that over 3,000 homes were at least partially collapsed, 39 fishing boats were sunk, and a 16,000 ton Korean freighter, THE SUN STAR, was capsized near Koahsiung harbor. Damage from flooding and landslides was widespread.

Nina entered the Formosa Straits with minimal typhoon strength, and weakened to approximately 60 kt before striking the China mainland on the 3rd at 1500Z. Nina moved inland and lost tropical cyclone characteristics on the 4th of August.

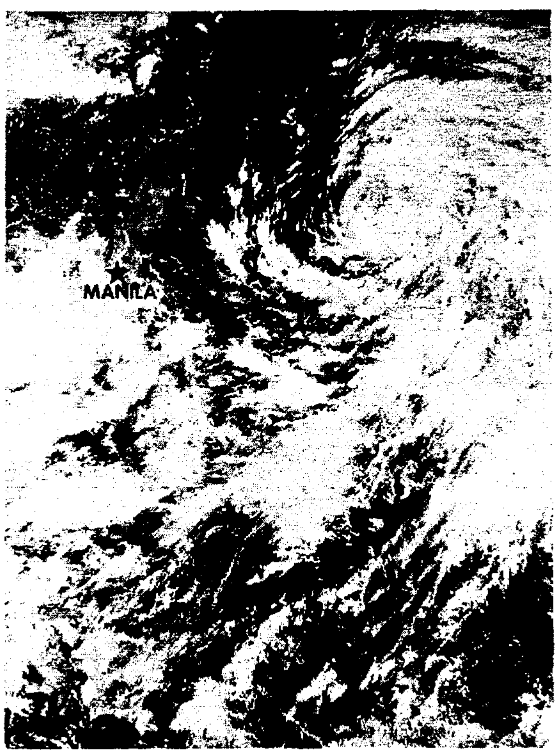


FIGURE 4-2. *Nina achieving tropical storm strength in the Philippine Sea 675 nm east-northeast of Manila, 31 July 1975, 2356Z. (DMSP imagery)*

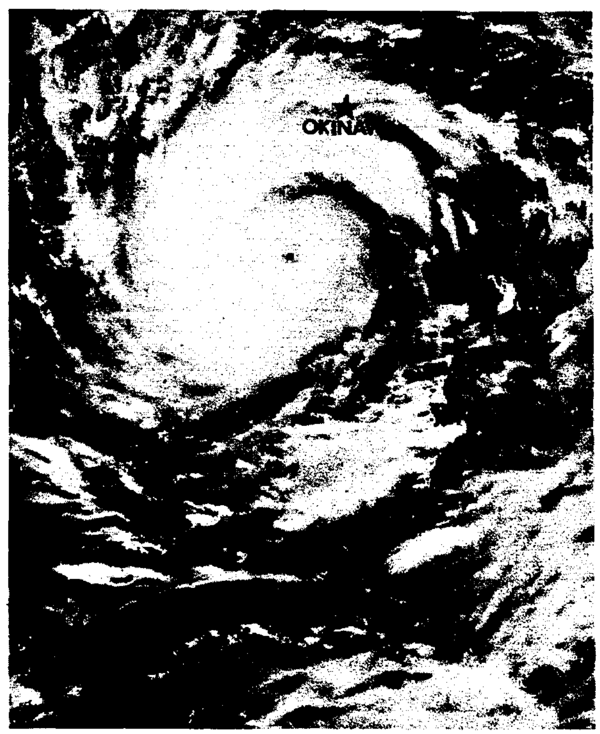
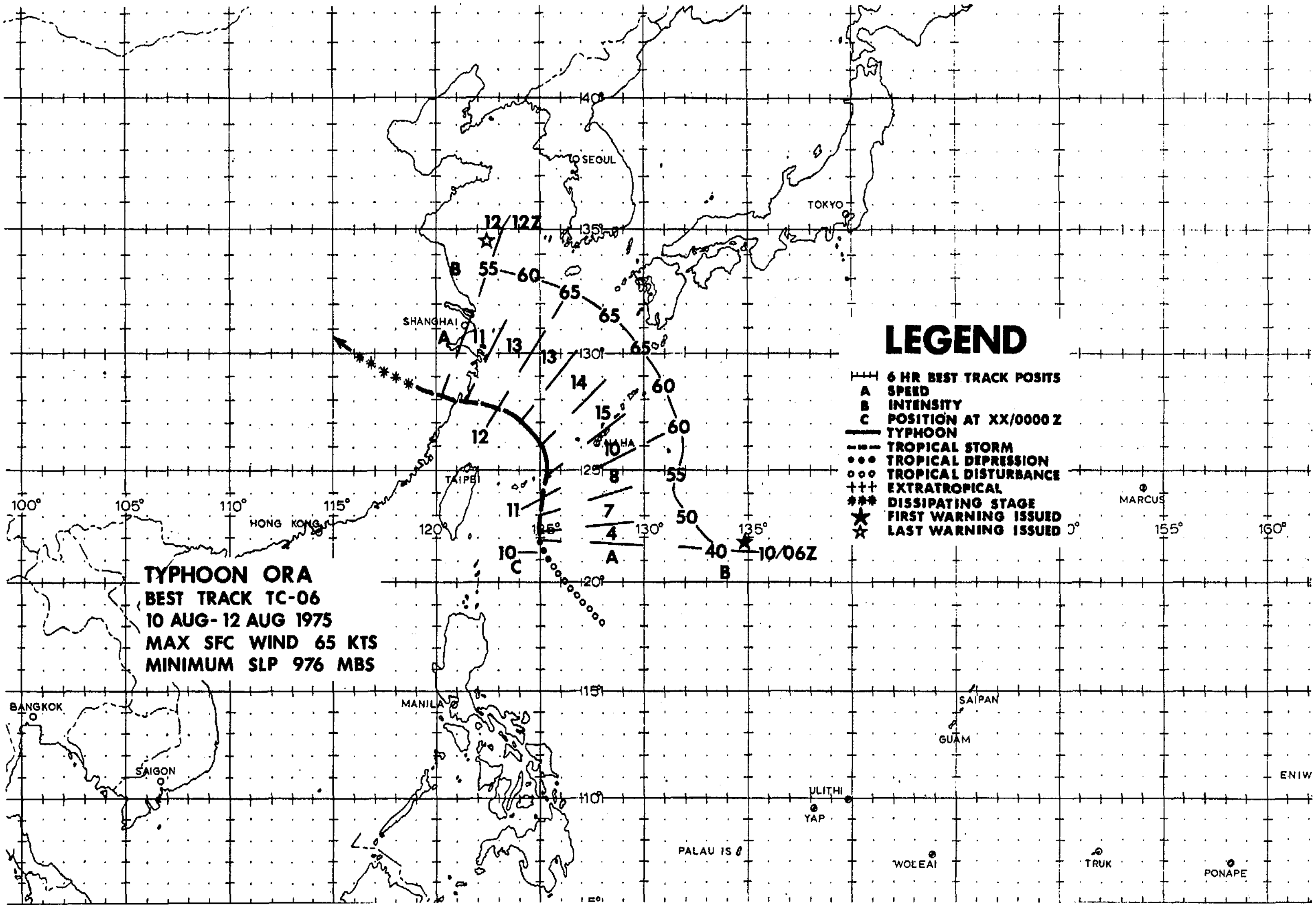


FIGURE 4-3. *Direct overhead photograph illustrating concentric wall clouds of Typhoon Nina during explosive deepening 235 nm south of Okinawa, 2 August 1975, 0332Z. (DMSP imagery)*


TYPHOON ORA
BEST TRACK TC-06
10 AUG- 12 AUG 1975
MAX SFC WIND 65 KTS
MINIMUM SLP 976 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
12/12Z
10/06Z
SEOUL
TOKYO
SHANGHAI
TAIPEI
NAHA
HONG KONG
MANILA
BANGKOK
SAIGON
MARCUS
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
ENIW

The third typhoon of the season, Ora, was small and short lived. Ora first appeared as a weak circulation in the near equatorial trough (drawn north by the influence of Typhoon Nina and T.D. 05) during the evening of the 8th. During the next 30 hr, this weak circulation moved northwestward at 6 kt showing little intensification.

On the morning of the 10th, a rapidly moving upper-level trough in the mid-latitude westerlies was located to the northwest of the circulation. This trough provided a highly efficient high altitude outflow channel which allowed Ora to grow from a tropical depression (Fig. 4-4) into a typhoon within 30 hr. As this trough moved quickly toward the east, Ora responded with a north-northeastward movement. When Ora's eye passed over Miyako Jima at 0600Z on the 11th, (Fig. 4-5) the weather station recorded 5 kt surface winds and a minimum pressure of 976 mb. Simultaneously, a ship (JL 11) 120 nm to the east reported 55 kt sustained winds. At 0749Z on the 11th, 50 kt gusts were recorded at Kadena AB, Okinawa, 150 nm northeast of Ora. As the trough passed to the east, the subtropical high over central China built rapidly eastward and Ora shifted northwestward and accelerated to 15 kt. By the morning of the 12th, Ora had turned westward at 13 kt until landfall was made on the 12th at 0800Z near Yung-chia on the central China coast.

From 0000Z on the 11th, until striking the China coast, Ora maintained typhoon strength winds of 65 kt. A surface high pressure cell moving eastward from the sea of Japan into the North Pacific, rendered Ora a highly asymmetric storm with 30 kt winds extending 300 nm to the northeast and only 150 nm to the southwest. Although little destruction was directly attributed to Ora, monsoon rains were spawned over the Philippines and caused widespread flooding and landslides. Choppy waters near Tocloban, Leyte capsized a crowded motorboat leaving 15 dead and 30 missing.

FIGURE 4-4. *Ora attaining tropical storm intensity 190 nm south of Miyako Jima with upper level trough to the west, 10 August 1975, 0033Z. (DMSP imagery)*

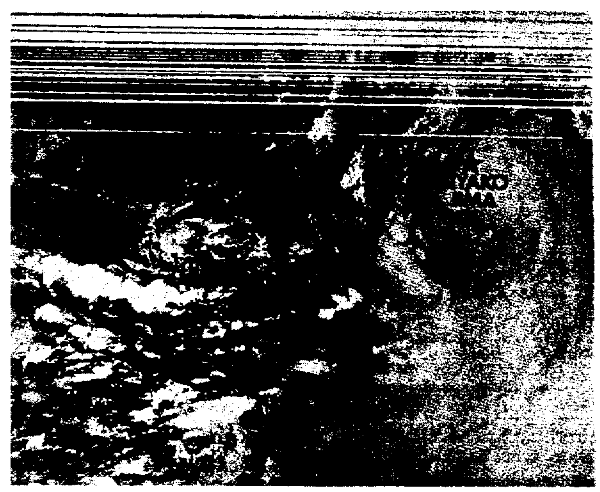
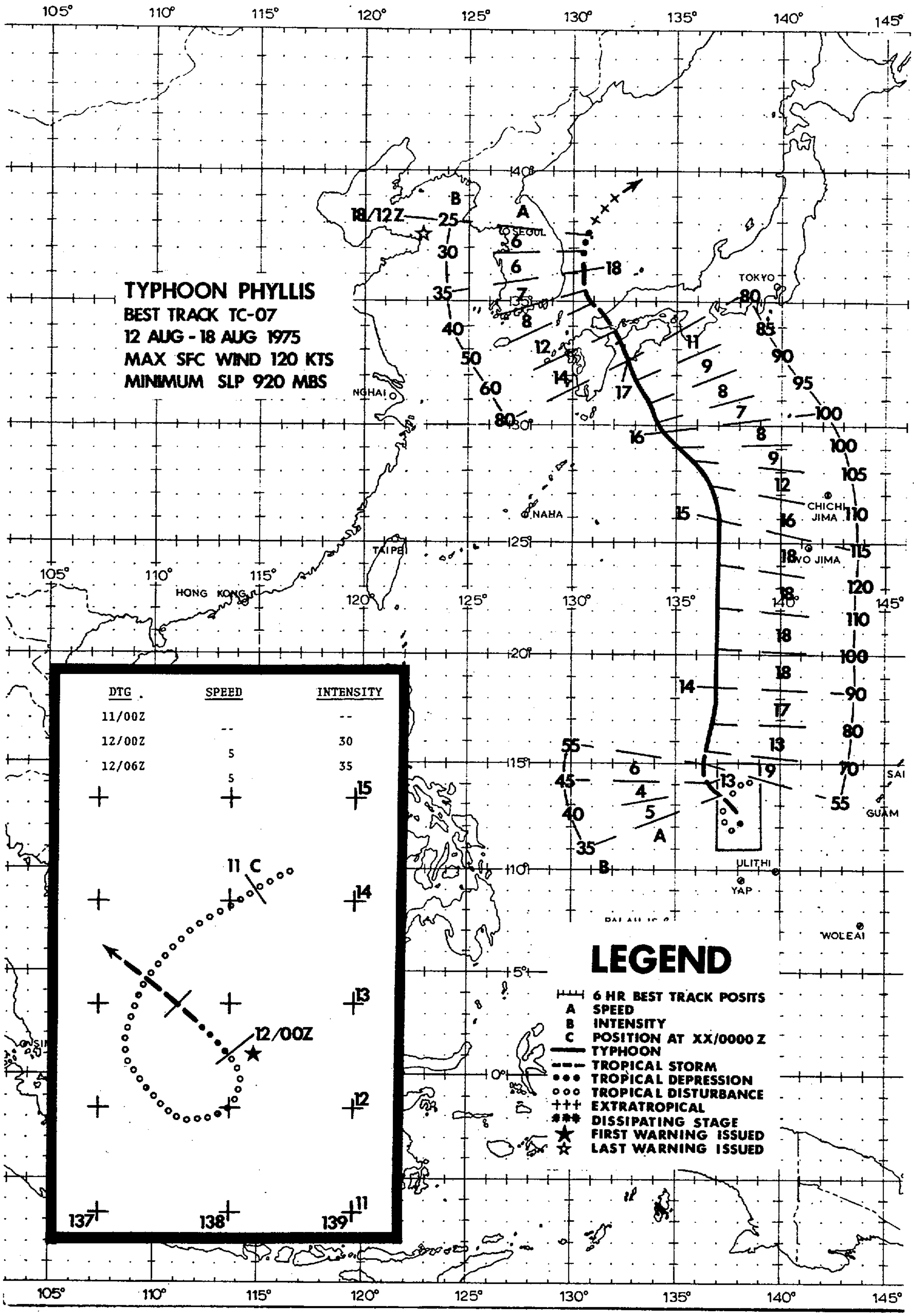


FIGURE 4-5. *Tropical Storm Ora 60 nm south of Miyako Jima just prior to reaching typhoon intensity, 11 August 1975, 0015Z. (DMSP imagery)*


TYPHOON PHYLLIS
BEST TRACK TC-07
12 AUG - 18 AUG 1975
MAX SFC WIND 120 KTS
MINIMUM SLP 920 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
DTG
SPEED
INTENSITY
11/00Z
12/00Z
12/06Z
5
5
30
35
11 C
12/00Z
18/12Z
SEOUL
TOKYO
NGHAI
NAHA
TAIPEI
HONG KONG
CHICHI JIMA
IWO JIMA
ULITHI
YAP
WOLEAI
GUAM

Since early August, the monsoonal trough had extended from the remains of Typhoon Nina in central China to an area west of Guam. A number of surface circulations appeared in this trough as early as the 8th of August, but it was not until the morning of the 11th that Phyllis first appeared as a tropical disturbance some 380 nm west-southwest of Guam.

The first warning on what was to become the fourth typhoon of 1975, was issued on the morning of the 12th. Aircraft reconnaissance located T.D. 07 395 nm west-southwest of Guam with center winds of 30 kt. At 0600Z on the 12th, the depression was upgraded to a 35 kt tropical storm. Aircraft reported multiple surface centers and a weak and diffuse 700 mb center.

Initially, the upper-level anticyclone was located 110 nm west of the surface center. However, by the morning of the 13th the upper and lower levels had become vertical. On the 13th at 0833Z, aircraft reported a closed wall cloud with an eye 30 nm in diameter. A Russian research vessel (EREC), reported surface winds of 60 kt 60 nm west-southwest of Phyllis at 1200Z on the 13th; thus, Phyllis was upgraded to typhoon with maximum winds of 70 kt.

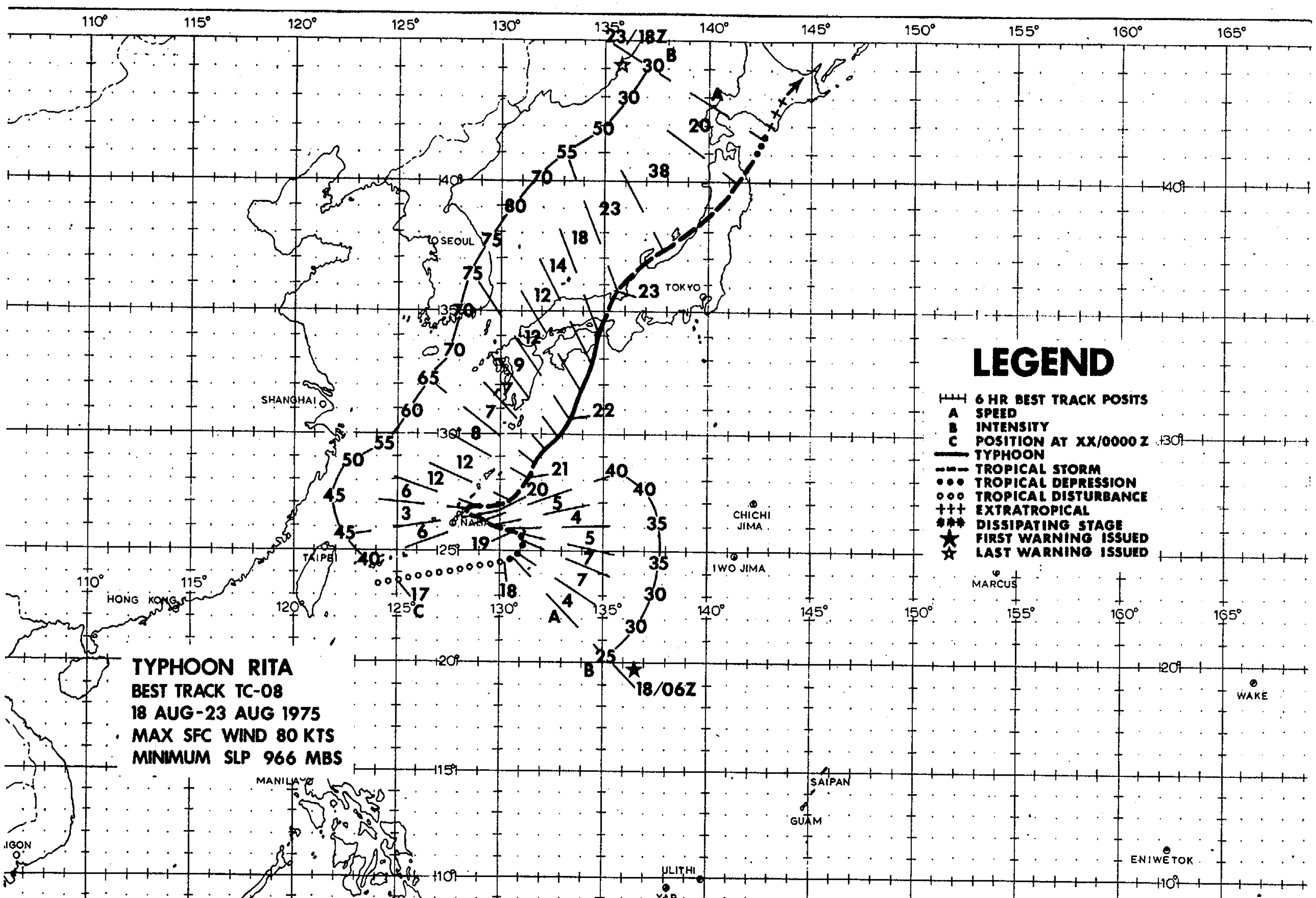
By the 13th the mid-tropospheric ridge over China began to weaken while the ridge east of Japan intensified. Twenty-four hours later, Phyllis' forward speed had increased to 18 kt (Fig. 4-6). The typhoon attained a maximum intensity of 120 kt on the 14th at 1800Z after aircraft had recorded a minimum sea level pressure of 920 mb at 1505Z (Fig. 4-7). By the 15th, Phyllis' movement had slowed to 7 kt, and had become northwestward as the mid-tropospheric ridge built westward across Japan.

After turning to the northwest, Phyllis once again accelerated, and by the afternoon of the 16th, was located 165 nm southeast of the Japanese Island of Shikoku. As Phyllis approached Japan, Shimizu (WMO station 47898, elev 99 ft), recorded sustained surface winds of 77 kt on the 16th at 1800Z and a minimum pressure of 970 mb at 2300Z. Murotomisaki (WMO station 47899, elev 606 ft), recorded sustained surface winds of 73 kt at 2000Z on the 16th. Phyllis, with 80 kt sustained winds, made landfall during the morning of the 17th near the southwestern edge of Shikoku.

In her wake Phyllis left extensive damage and loss of life. On Shikoku alone there were at least 60 dead, 146 injured, and 12 missing due to the combination of heavy rains, flooding and numerous landslides. At least 489 houses were reported collapsed, 577 damaged, 58 washed away and thousands inundated. Phyllis passed 20 nm to the west of Iwakuni MCAS which reported maximum gusts of 38 kt.

FIGURE 4-6. *Typhoon Phyllis in the Philippine Sea with 90 kt intensity, 13 August 1975, 2320Z. (DMSP imagery)*

FIGURE 4-7. *Typhoon Phyllis near peak intensity 230 nm west of Iwo Jima, 14 August 1975, 2302Z. (DMSP imagery)*


TYPHOON RITA
BEST TRACK TC-08
18 AUG-23 AUG 1975
MAX SFC WIND 80 KTS
MINIMUM SLP 966 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
23/18Z
18/06Z
SEOUL
TOKYO
SHANGHAI
TAIPEI
HONG KONG
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
MANILA
SAIPAN
GUAM
ULITHI
YAP
ENIWETOK

The third typhoon in August, Rita, made landfall in Japan closely following the wake of Typhoon Phyllis. Due to heavy rains brought by Rita, the storm proved to be the most damaging to affect the northern Japanese islands since 1965.

The typhoon's birth can be traced to the development of a monsoon depression some 180 nm southeast of Okinawa on the 18th. Drifting first east then westward, Rita began to gain strength as aircraft reconnaissance reports verified storm force winds in the circulation on the following day. Due to a weakening subtropical high cell east of Japan, heights began to fall north of Rita. In response, the storm reversed track to an easterly direction a few miles off the northern tip of Okinawa. A minimum pressure of 983.4 mb was registered at Kadena Air Base on the 20th at 0620Z although winds were comparatively light with a peak gust of 37 kt from the northwest recorded at 0514Z.

An approaching short wave over Manchuria began to draw Rita on a more northward course late on the 20th (Fig. 4-8). By the afternoon of the 21st, typhoon force winds were reached and Rita's circulation had grown significantly in size. Due to the building pressure gradient associated with the high cell east of Japan, gale force winds extended some 300 nm in the typhoon's eastern semicircle. As the short wave continued to approach the typhoon, Rita accelerated gradually in a north-northeasterly direction, making landfall 30 nm west of Osaka late on the 22nd (Fig. 4-9). Prior to landfall, Rita's 40-60 nm diameter eye passed over Murotomisaki (WMO station 47899, elev 606 ft), Shikoku. The station experienced a pressure reading of 966.3 mb at 1200Z and sustained surface winds of 80 kt.

Quickly crossing central Honshu, Rita veered slightly and accelerated to speeds of 30-35 kt ahead of an advancing cold front in the Sea of Japan. First tracking along the western coast, Rita crossed the northern portion of Honshu, finally emerging back into the Pacific on a northeasterly heading. Strong gusty winds occurred along the exposed southern coast of Honshu between the Kii and Boso peninsulas. Southerly winds gusting near 55 kt were recorded at Yokota Air Base between 0300Z and 0400Z on the 23rd.

Merging with the frontal zone south of Hokkaido, Rita continued to track northeastward as an extratropical low. Torrential rains swept Hokkaido with amounts totaling near 8.2 inches in 24 hr. Landslides and flash flooding as a result of the rains were responsible for extensive crop and property damage with farmlands inundated and 36,000 houses flooded throughout Japan. At least 26 deaths were attributed to the typhoon. Newspaper reports indicate that it was the worst flooding in 10 years for Hokkaido. Several major rivers on the island overflowed their banks leaving towns marooned and isolated.

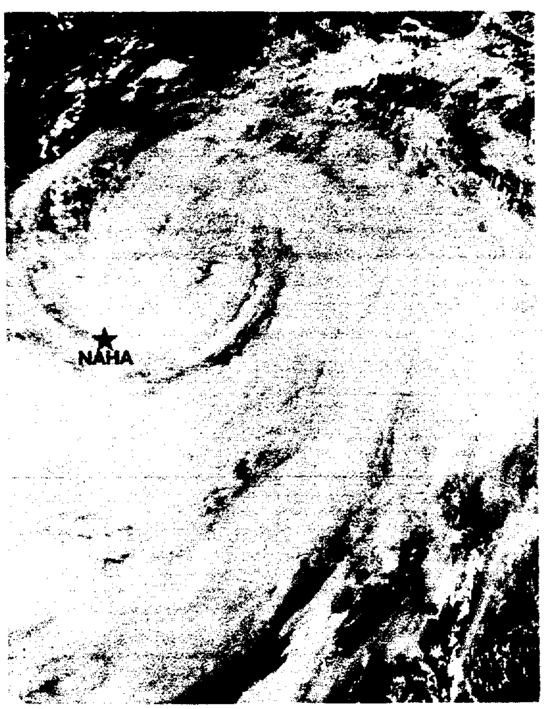


FIGURE 4-8. *Rita as a 60 kt tropical storm 190 nm northeast of Okinawa, 20 August 1975, 2253Z. (DMSP imagery)*

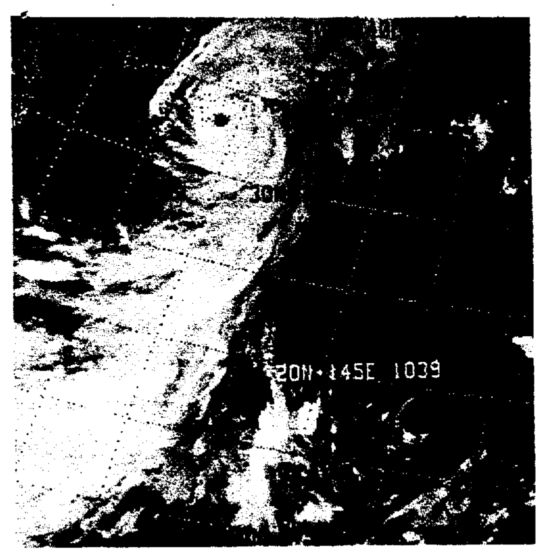
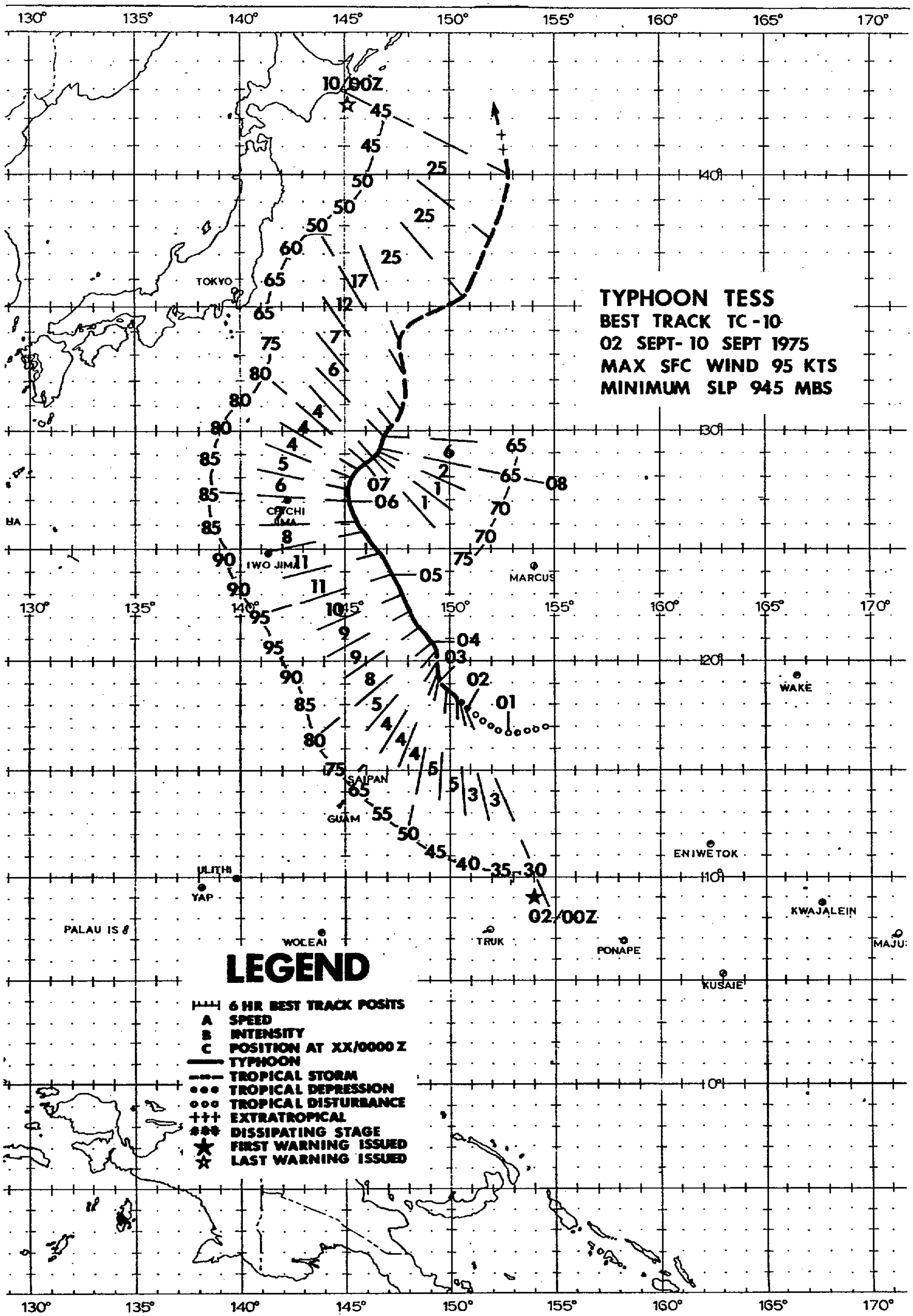


FIGURE 4-9. *Infrared photograph of Typhoon Rita just prior to landfall in Japan, 22 August 1975, 1843Z. (NOAA-4 imagery)*


TYPHOON TESS
BEST TRACK TC-10
02 SEPT-10 SEPT 1975
MAX SFC WIND 95 KTS
MINIMUM SLP 945 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
10/00Z
02/00Z
TOKYO
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
ENIWETOK
KWAJALEIN
KUSAIE
MAJURO
130° 135° 140° 145° 150° 155° 160° 165° 170°

Satellite data on the evening of 31 August first showed preliminary upper-level features indicative of a formative outflow pattern. Divergent flow on the southern side of the persistent tropical upper tropospheric trough (TUTT) was enhancing the tropical cyclone formation process and a closed surface circulation was analyzed in the same area the following morning, 600 nm east-northeast of Saipan. Mid-tropospheric ridging from Japan to the Dateline initially caused Tess' embryo to drift west-southwest. As this ridge weakened, the system began tracking west-northwest, developing slowly. As the TUTT migrated toward the north, an anticyclone was established over the surface circulation, which was now located 280 nm east of Pagan Island in the northern Mariana Islands.

The first warning on Tess was issued on the morning of 2 September after reconnaissance aircraft and satellite data indicated rapid development. Tess was upgraded to a typhoon on the 3rd at 1200Z when reconnaissance aircraft reported surface winds of 75 kt approximately 250 nm west of the Maug Islands. The typhoon was now moving in a more northerly direction toward a weakness in the collapsing mid-tropospheric ridge to the north. Thirty hours later on the 4th at 1800Z, Tess reached a minimum central pressure of 945 mb and maximum sustained surface winds of 95 kt.

Tropical Storm Viola had formed approximately 1200 nm southwest of Tess on the 4th and subsequently moved within 900 nm of Tess before dissipating on the 7th (Fig. 4-10). Viola's presence helps explain Tess' reduced speed of movement and irregular track during this period. On the 7th at 0000Z, the SS OREGON reported estimated surface winds of 65 kt while 60 nm east-southeast of the storm's center (Fig. 4-11). Tess maintained typhoon intensity until the 8th at 1800Z, when it moved into a hostile environment of colder water and began interacting with an approaching frontal system. Satellite data indicated that the typhoon was becoming extratropical, and by the morning of the 10th Tess had merged into the frontal system.

The entire life time of Tess was spent between 153E and 145E, an area of the western North Pacific having few populated islands. This system did little if any damage during its ten day lifespan.

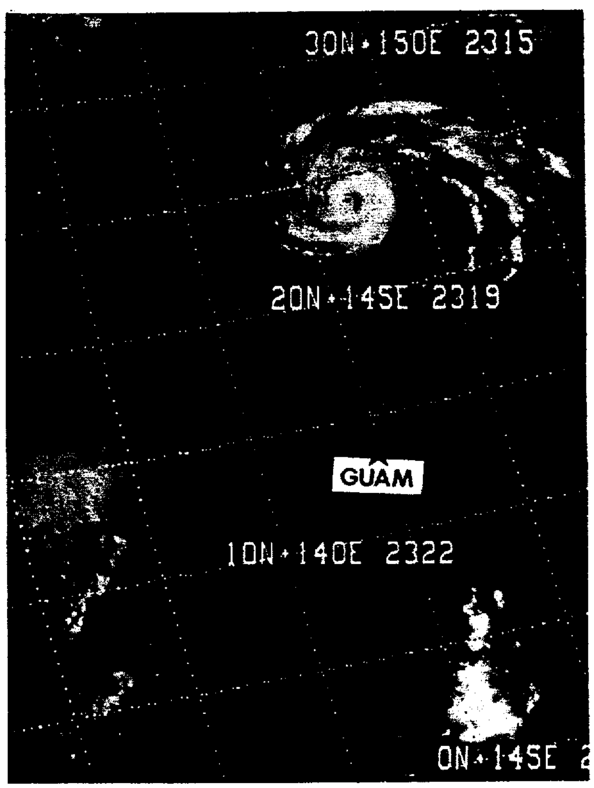


FIGURE 4-10. *Typhoon Tess 620 nm north-northeast of Guam. Tropical Depression 11, which developed into Tropical Storm Viola, can be seen approximately 850 nm to the southwest of Tess, 4 September 1975, 2317Z. (NOAA-4 imagery)*

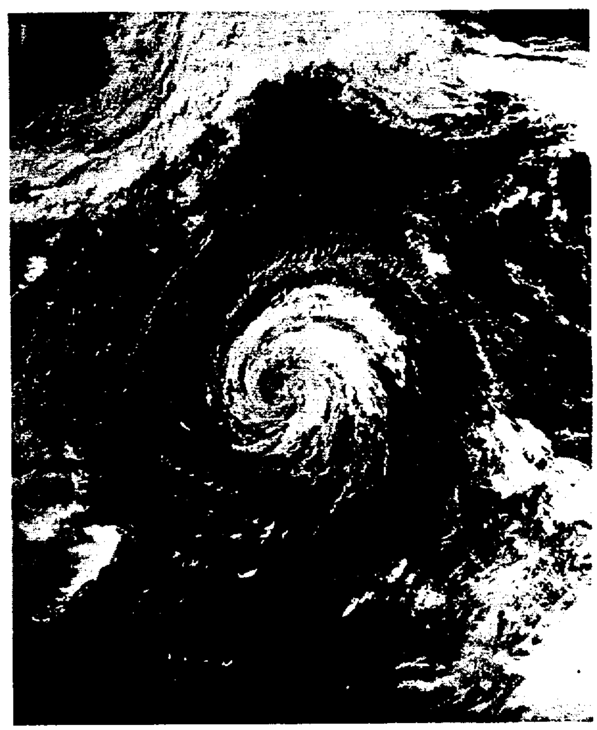
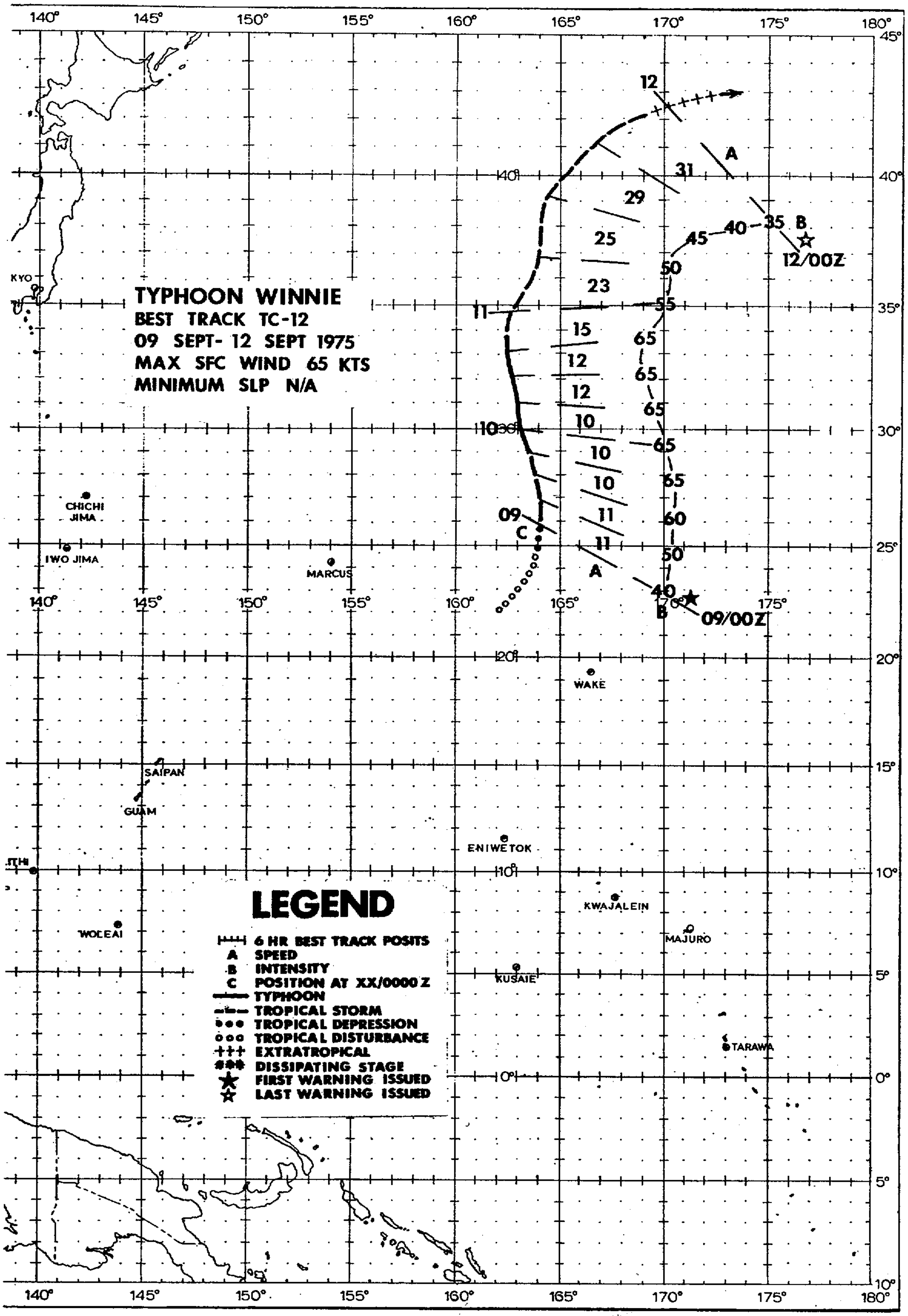


FIGURE 4-11. *Typhoon Tess 265 nm east-northeast of Chichi Jima, 7 September 1975, 2227Z. (DMSP imagery)*



TYPHOON WINNIE
BEST TRACK TC-12
09 SEPT- 12 SEPT 1975
MAX SFC WIND 65 KTS
MINIMUM SLP N/A
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
09/00Z
12/00Z
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ENIWETOK
KWAJALEIN
MAJURO
KUSAIE
WOLEAI
TARAWA

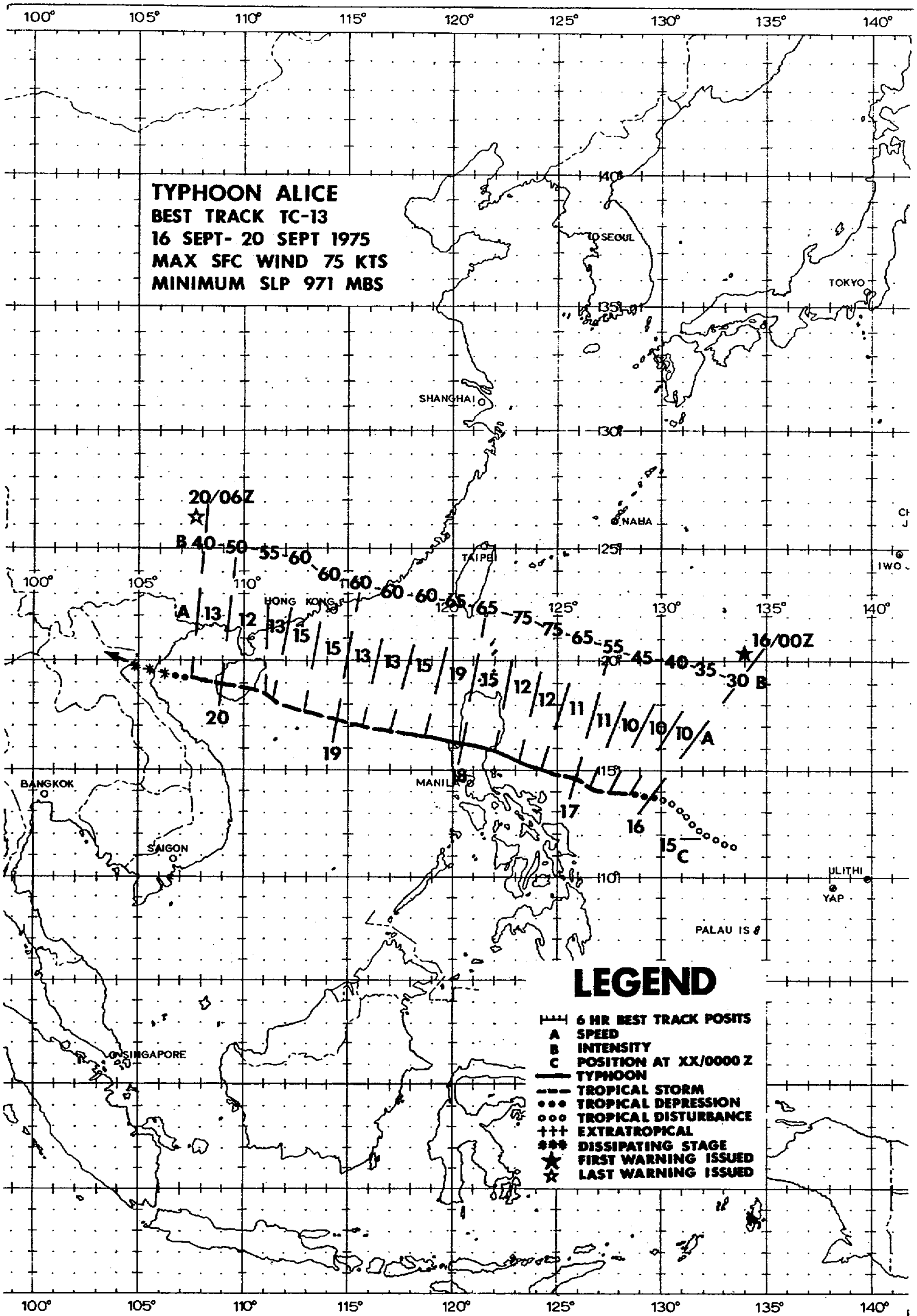
Winnie was first detected by satellite on 5 September as a weak tropical disturbance approximately 300 nm northwest of Wake Island. At this time Typhoon Tess was approximately 900 nm to the northwest of Winnie with a surface trough extending southeastward to Wake Island. The combination of surface troughing and a favorable upper air pattern allowed this disturbance to develop. The first warning was issued early on the morning of the 9th based on satellite data.

From her initial detection as a disturbance, Winnie moved slowly north-northeastward, attaining minimal tropical storm intensity at 2100Z on the 8th. The storm was now 400 nm north-northwest of Wake Island and posed no significant threat to any inhabited islands. However, as reported by the Pacific Stars and Stripes, Winnie did represent a threat to shipping and in fact sank a 44 ft sailboat, THE FLATBUSH MAN, on a pleasure cruise from Marcus Island to Hawaii. The four people aboard were adrift for 13 days in a rubber raft until 21 September when a Russian whaling vessel picked them up.

From the time of initial tropical storm strength until 1200Z on the 11th, Winnie was steered on a northerly course by the combination of a sharp mid-tropospheric trough to the west and a blocking ridge to the east. A 200 mb trough extending to the west of Winnie inhibited development past minimal typhoon strength with typhoon force winds persisting only for a 24 hr period from 1800Z on the 9th to 1800Z on the 10th (Fig. 4-12). A Japanese ship (JEEU), located approximately 35 nm north of Winnie, reported sustained winds of 65 kt at 1800Z on the 9th.

Approaching a frontal system near 35N, Winnie came under stronger steering flow, accelerated to near 20 kt, and began to weaken. A short wave trough moving through the long wave ridge diminished its amplitude and Winnie assumed a more northeasterly track while continuing to accelerate. By 0000Z on the 12th, Winnie was absorbed into the frontal system and became an extratropical system with maximum winds of 30 kt.

FIGURE 4-12. *Typhoon Winnie 650 nm north-northwest of Wake Island, 9 September 1975, 2151Z. (DMSP imagery)*



TYPHOON ALICE
BEST TRACK TC-13
16 SEPT- 20 SEPT 1975
MAX SFC WIND 75 KTS
MINIMUM SLP 971 MBS
SEOUL
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
MANILA
BANGKOK
SAIGON
SINGAPORE
ULITHI
YAP
PALAU IS
IWO
20/06Z
16/00Z
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED

On 11 September, the TUTT extended westward across the western North Pacific into the South China Sea with several cyclonic cells apparent along the trough axis. On the morning of the 12th, a tropical disturbance was identified on satellite data to the south of the TUTT, near 12N 148E. Outflow weakened over the disturbance as the TUTT moved to the northwest rendering upper-level divergence insufficient to induce a surface vortex and stimulate further development. The anticyclone drifted westward with little apparent change until the 15th, when it moved over a small vortex in the monsoon trough near 13N 131E. As this upper-level anticyclone became vertically aligned over the surface cyclone, the system underwent rapid tropical cyclone development.

This system became Tropical Storm Alice on the afternoon of the 16th and intensified to typhoon strength within 24 hr (Fig. 4-13). On the 17th at 1430Z, aircraft reconnaissance data indicated a 32 mb drop in central pressure during the previous 21 hr, and maximum flight level winds of 105 kt were recorded on this eye penetration.

Reduced inflow resulting from the development of Typhoon Betty (1200 nm to the east) inhibited further development as Alice approached central Luzon. At 2000Z on the 17th the typhoon made landfall near Casiguran, Luzon with maximum surface winds of 75 kt.

Alice passed Luzon near 16N, and entered the South China Sea at 0400Z on the 18th with surface winds of 65 kt (Fig. 4-14). Wallace Air Station reported winds of 40 kt with gusts to 60 kt at 0129Z and a peak gust of 42 kt was recorded at Baguio at 0432Z. No significant damage was reported during the Luzon crossing.

Alice continued to a west-northwest track across the South China Sea in response to moderate steering flow along the southern periphery of the 500 mb subtropical ridge. Maximum surface winds decreased to 60 kt at 1200Z on the 18th and Alice maintained that intensity until just prior to striking the Hainan coast at 1800Z on the 19th. Alice was still well-organized as she entered the Gulf of Tonkin with 50 kt winds, but weakened rapidly thereafter and dissipated upon moving inland over North Vietman.

FIGURE 4-13. *Alice as a 55 kt tropical storm 90 nm east-northeast of Catanduanes Island, 16 September 1975, 2205Z. (DMSP imagery)*

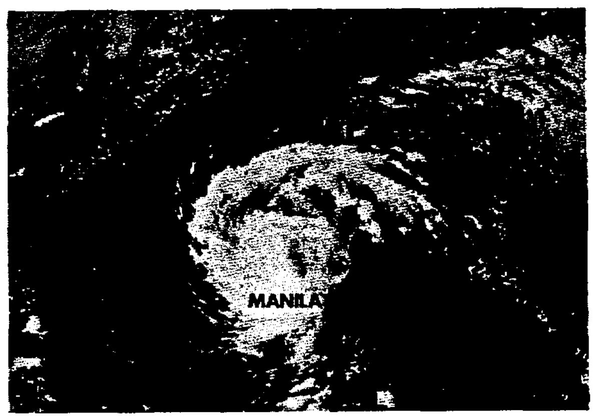
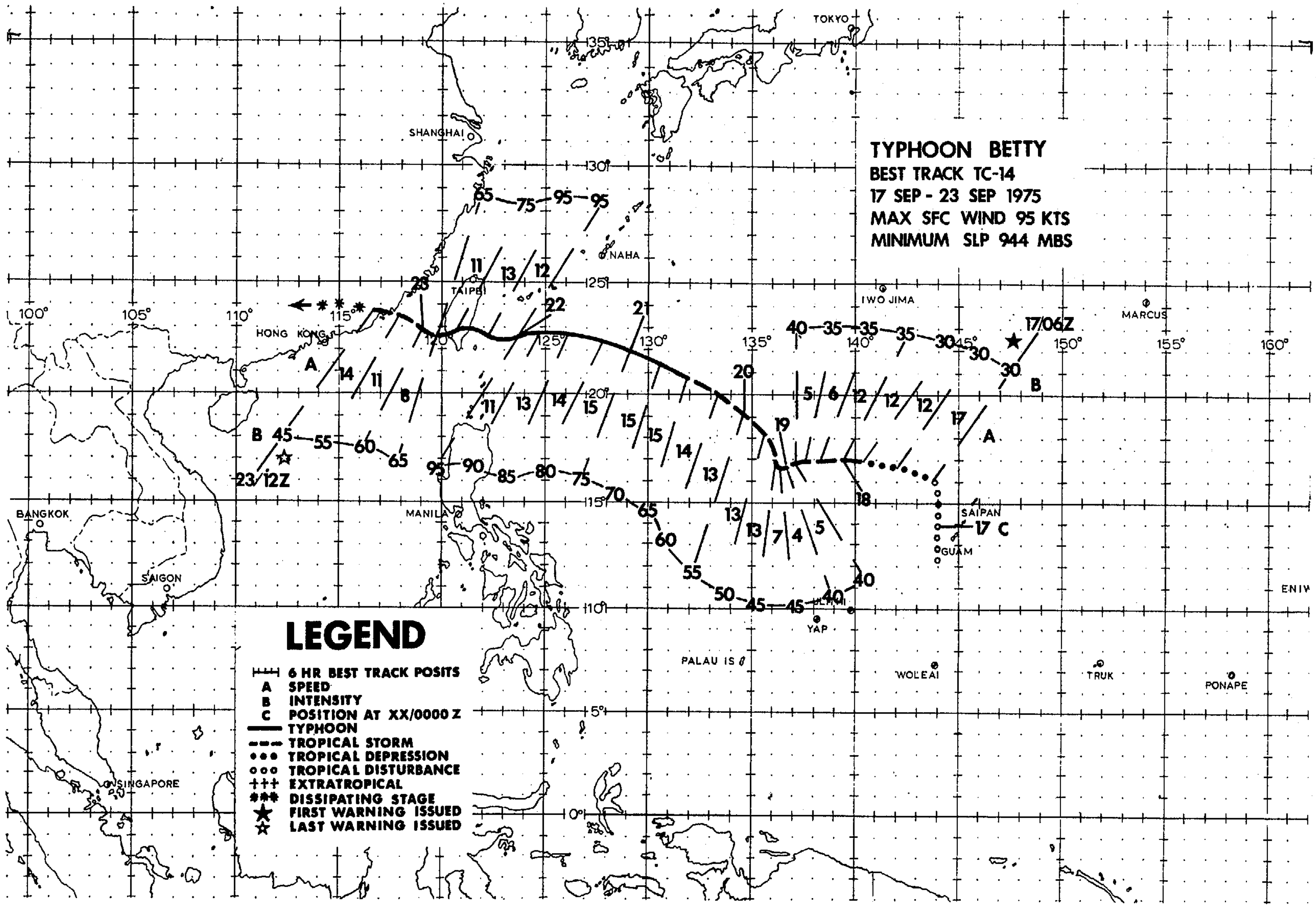


FIGURE 4-14. *Typhoon Alice entering the South China Sea after traversing central Luzon, 18 September 1975, 0411Z. (DMSP imagery)*



TYPHOON BETTY
BEST TRACK TC-14
17 SEP - 23 SEP 1975
MAX SFC WIND 95 KTS
MINIMUM SLP 944 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
17/06Z
23/12Z
17 C
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
IWO JIMA
MARCUS
MANILA
BANGKOK
SAIGON
SAIPAN
GUAM
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
SINGAPORE

As Typhoon Alice approached the Philippine Islands on the 16th of September, another tropical circulation was detected in the monsoonal trough some 200 nm south of Guam. Moving northward at nearly 20 kt, this disturbance passed within 50 nm of Guam early on the 17th. By the afternoon of the 17th the circulation, now T.D. 14, turned sharply to the west as it approached the southern periphery of the subtropical ridge. T.D. 14 attained tropical storm intensity on the morning of the 18th while moving westward at 12 kt.

The subtropical ridge to the west of T.S. Betty was weakened by a series of middle tropospheric short wave troughs. This produced weak steering currents for the storm and the westward movement slowed to 5 kt. By the 19th the subtropical ridge, influenced by Typhoon Alice, intensified and receded to the north. In response, Betty began moving northwestward and accelerated to 13 kt.

On the 19th, as a weak upper tropospheric trough to the west deepened, and created a highly efficient outflow channel to the mid-latitude westerlies, Betty began to intensify (Fig. 4-15). By the 20th, Alice had weakened, allowing the subtropical ridge northwest of Betty to build southward. Betty again responded by moving westward. At 0230Z on the 22nd, Typhoon Betty attained a maximum intensity of 95 kt as reconnaissance aircraft recorded a minimum sea-level pressure of 944 mb. The outflow channel to the north (evident on the 19th) was severed by the 21st (Fig. 4-16), but by then Betty had established an outflow channel to the upper tropospheric monsoon easterlies to the south; thus, Betty continued to intensify until the 22nd.

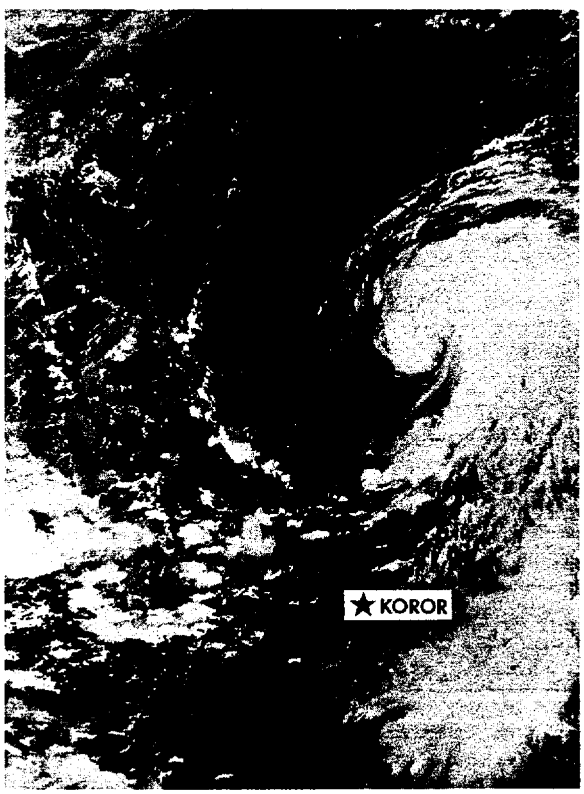


FIGURE 4-15. *Betty as a 55 kt tropical storm in the Philippine Sea 720 nm north of Koror, 19 September 1975, 2352Z. (DMSP imagery)*

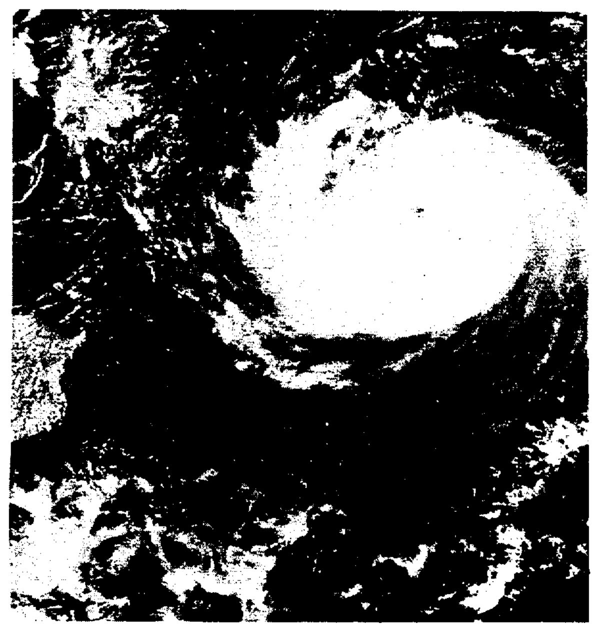


FIGURE 4-16. *Typhoon Betty as she heads toward Taitung, Taiwan 400 nm to the west, 21 September 1975, 0315Z. (DMSP imagery)*

At 1200Z on the 21st, a ship located 140 nm northeast of the storm estimated winds at 55 kt and seas of 27 ft. The 22 September 0000Z rawinsonde at Ishigakishima (110 nm NNE of Betty) showed 70 kt winds from the 3,000 ft through the 18,000 ft level.

The typhoon, when some 120 nm from Taiwan, was placed under constant surveillance by the radar at Hualien, Taiwan (Fig. 4-17). Figures 4-17a and 4-17b enable comparison of the microwave (radar) presentation and the visible (satellite) presentation. Upon reaching Taiwan, Betty began to weaken. The typhoon's track became west-northwestward as the storm interacted with a lee-side trough created by the high mountain ranges on Taiwan. Packing winds near 80 kt, Betty crossed into southern Taiwan about 15 nm north of Taitung. Unofficial reports indicated 12 dead, scores injured, and hundreds homeless in the typhoon's wake. Nearly a thousand tourists were stranded as mud slides covered highways. In addition, more than 200 homes were leveled and hundreds of others damaged.

After crossing the mountains of southern Taiwan, the storm's track became west-southwestward. Weakened by the rugged terrain, Betty entered the Taiwan Strait as a minimal typhoon. It continued to weaken and crossed the Chinese coast on the evening of the 23rd with 50 kt winds. By the 24th, Betty had degenerated into a low pressure area some 100 nm north of Hong Kong.

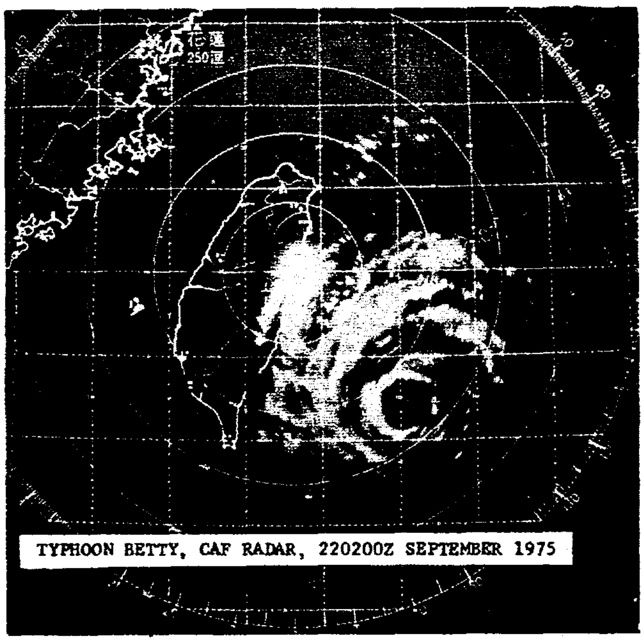


FIGURE 4-17. *Radar presentation of Typhoon Betty near peak intensity some 135 nm east of Taitung, 22 September 1975, 0200Z.*

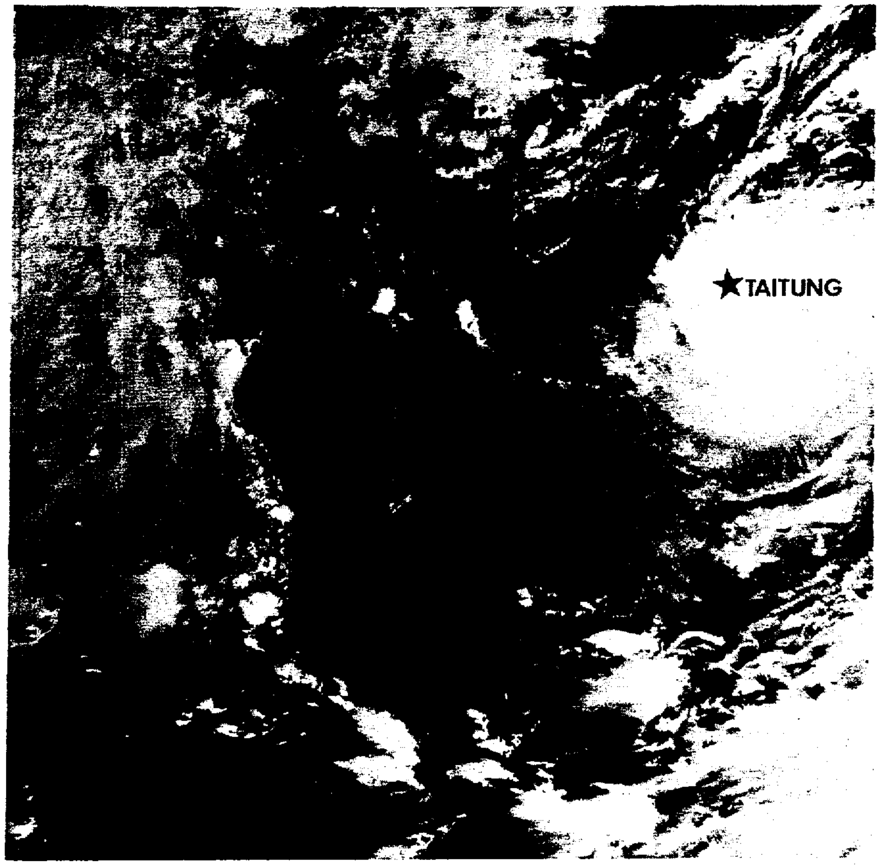


FIGURE 4-17a. *Typhoon Betty at 95 kt peak intensity some 135 nm east of Taitung, Taiwan, 22 Sept 1975, 0057Z. (DMSP imagery)*

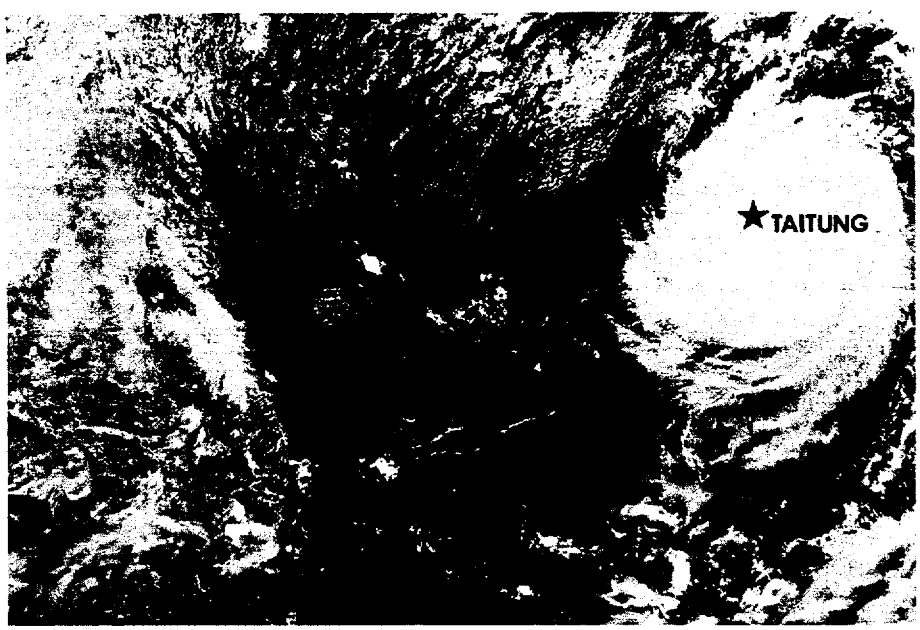
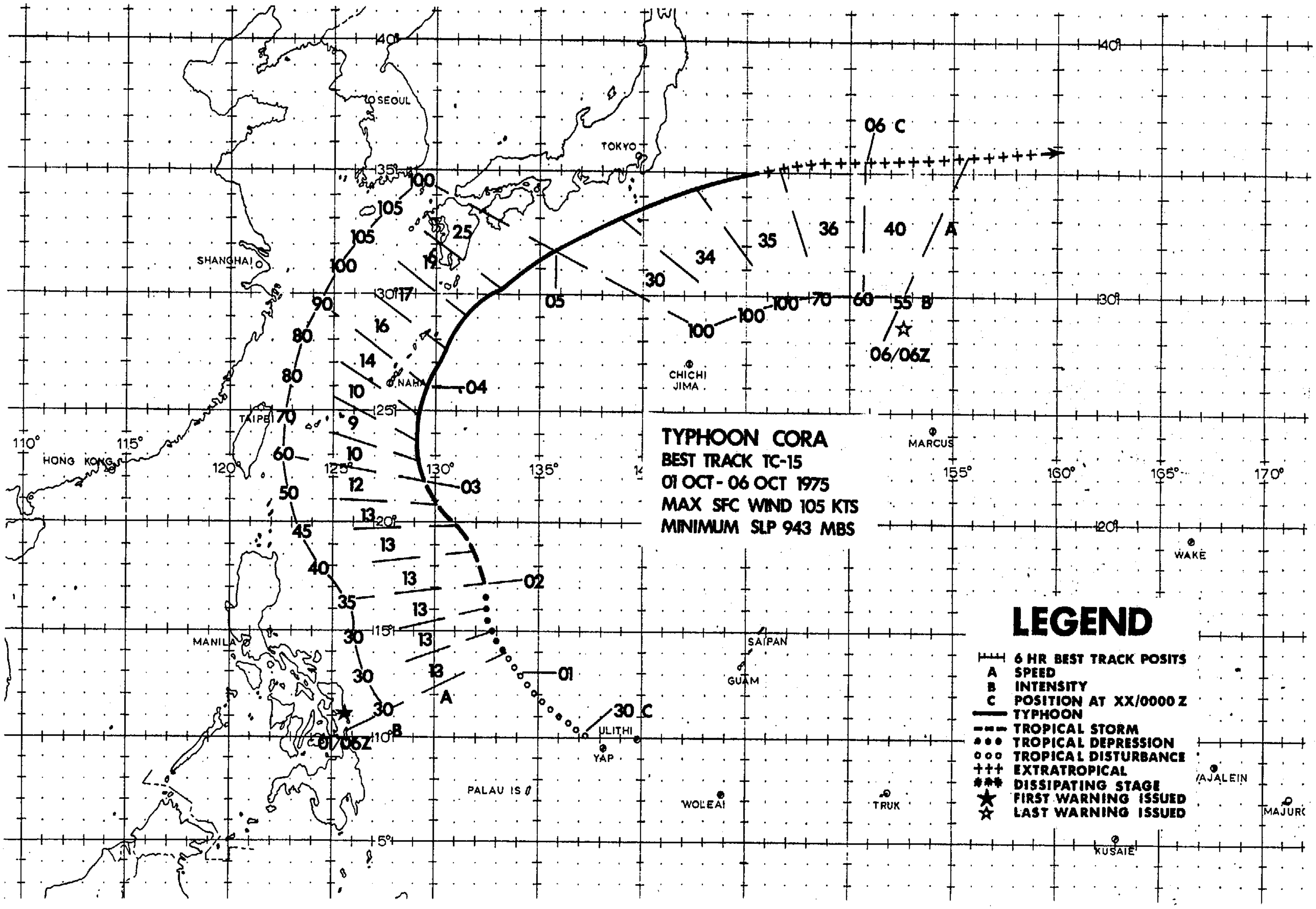


FIGURE 4-17b. *Typhoon Betty at peak intensity some 95 nm east of Taitung, 22 Sept 1975, 0438Z. (DMSP imagery)*


TYPHOON CORA
BEST TRACK TC-15
01 OCT - 06 OCT 1975
MAX SFC WIND 105 KTS
MINIMUM SLP 943 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SEOUL
TOKYO
SHANGHAI
NAHA
TAIPEI
HONG KONG
MANILA
CHICHI JIMA
MARCUS
WAKE
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
KWAJALEIN
MAJURO
KUSAIE
06/06Z
01/06Z

Weak troughing in the low level easterlies spawned a disturbance near 10N 142E on the morning of 29 September, as indicated by satellite and synoptic data. This disturbance drifted west-northwest for the next several days; on 1 October, aircraft reconnaissance reported surface winds of 30 kt.

For the next 24 hr, the 700 mb center was displaced as much as 25 nm to the northwest of the large and diffuse surface center. This center had a diameter as large as 80 nm with weak temperature and pressure gradients, and correspondingly light winds. From initial detection until the evening of the 3rd, development of a good outflow channel to the west and northwest was restricted by an upper tropospheric trough to the west. Despite this lack of outflow, the storm continued to develop. Cora was upgraded to typhoon strength on the 3rd when aircraft reconnaissance reported 70 kt surface winds and a closed wall cloud. The system continued to lack good vertical structure through the evening of the 3rd when the 700 mb center was still displaced east of the surface center.

For the first 48 hr, Cora was situated between two large high pressure cells and moved toward the northwest at 13 kt. On the 3rd, the high pressure cell north of Taiwan began to weaken rapidly and collapsed. Strong ridging was now building to the east of Cora. At this time (Fig. 4-18), Cora began to slow down prior to a gradual recurvature near 25N.

As Cora passed 100 nm to the east of Okinawa on the morning of the 4th, Kadena AB recorded a peak gust of 31 kt. The system now began a gradual acceleration as it entered an area of strong westerlies to the northeast of the high pressure cell. That evening Cora attained a minimum central pressure of 943 mb and maximum sustained surface winds of 105 kt (Fig. 4-19). Both satellite and synoptic data indicated excellent outflow in all quadrants except the northwest where a minor trough was still restricting the outflow.

By the morning of the 5th, satellite and synoptic data indicated that the primary upper-level outflow was now confined to the north-northeast. Although Cora was in an area of strong vertical shear, typhoon strength winds were still maintained for the next 24 hr. Moving to the northeast at 30 kt, the typhoon continued to come into increasingly strong westerly steering flow. Cora passed 120 nm south-southeast of Tokyo on the evening of the 5th.

Satellite data on the 6th indicated that there was very little upper-level outflow, but an apparent low-level circulation was still visible. The remains of Cora were now moving to the east at 40 kt as an extratropical system with surface winds of 55 kt.

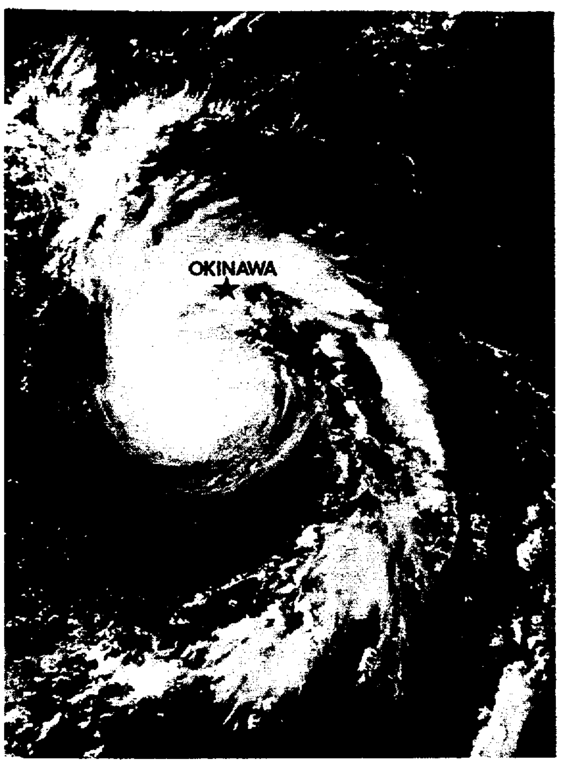


FIGURE 4-18. *Cora just prior to attaining typhoon intensity 255 nm south-southeast of Okinawa, 3 October 1975, 0254Z. (DMSP imagery)*

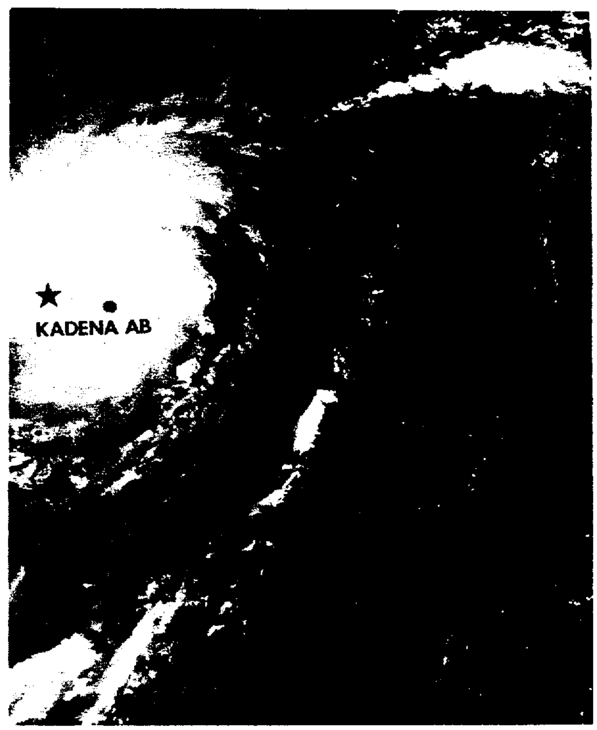
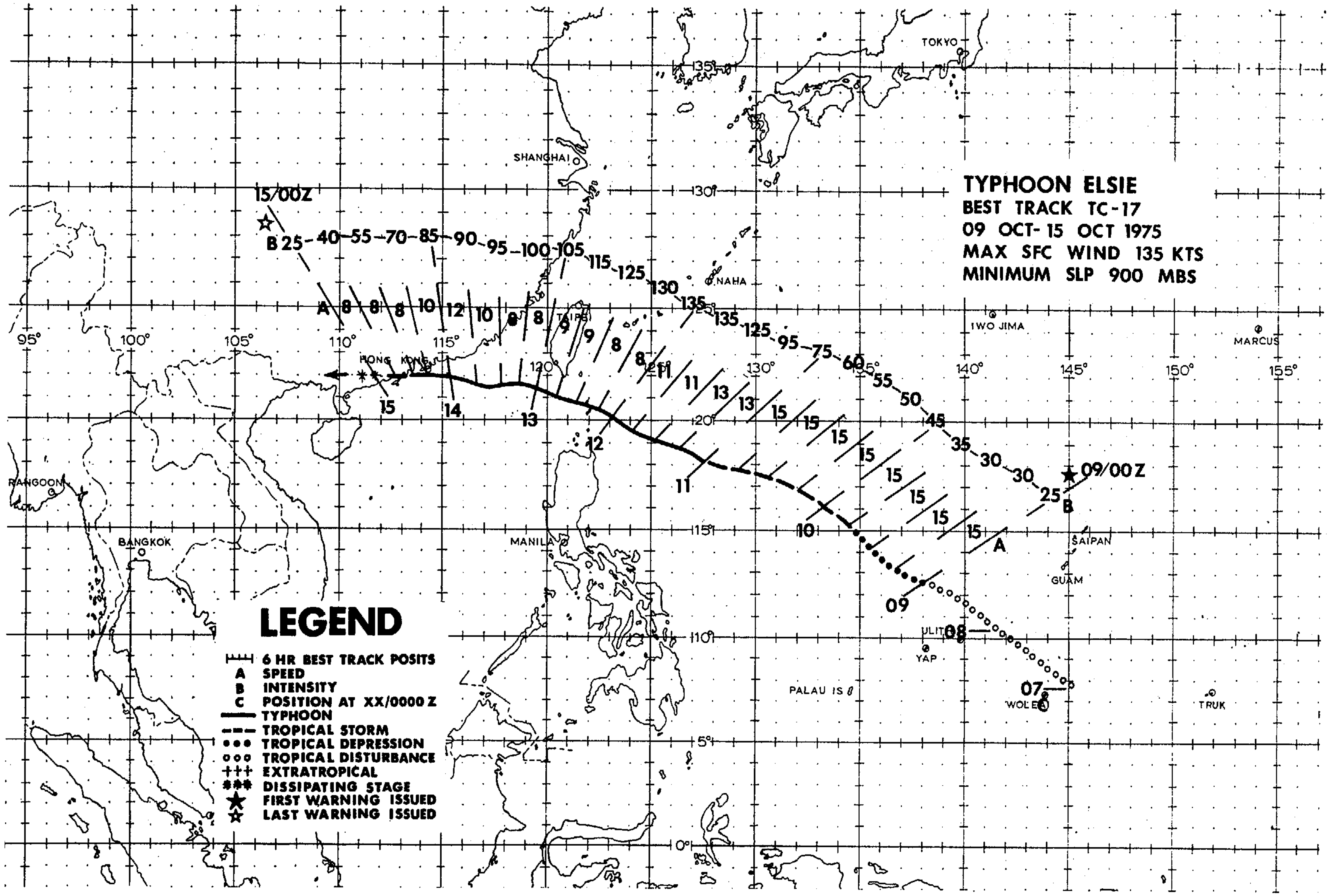


FIGURE 4-19. *Typhoon Cora near 95 kt 115 nm east of Kadena AB, Okinawa, 4 October 1975, 0236Z. (DMSP imagery)*


TYPHOON ELSIE
BEST TRACK TC-17
09 OCT- 15 OCT 1975
MAX SFC WIND 135 KTS
MINIMUM SLP 900 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
15/00Z
09/00Z
TOKYO
SHANGHAI
NAHA
IWO JIMA
MARCUS
HONG KONG
TAIPEI
RANGOON
BANGKOK
MANILA
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK

By the 6th of October, the monsoonal trough had become quite active and was oriented east-west along 8N from the Philippines to 160E. Typhoon Elsie developed in this trough with a well-defined surface circulation located approximately 250 nm southwest of Guam on the 8th. The first warning was issued on the morning of the 9th and Elsie attained typhoon strength 48 hr later. At this point, Elsie began slowing down as the storm approached the western extent of the mid-tropospheric subtropical ridge.

Elsie then underwent explosive deepening (Fig. 4-20) and aircraft reconnaissance recorded a 69 mb drop in the central pressure at the typhoon center between the 102052Z and 111430Z fixes. The maximum surface winds increased from 65 kt to 135 kt during this period.

As Elsie approached the Bashi Channel, Basco, in the Bataan Islands (WMO station 98135, elev 184 ft), 40 nm east of Elsie's center, reported maximum sustained winds of 65 kt. Elsie continued moving west-northwest through the Bataan Islands on the 12th. As the sub-tropical ridge then built westward, Elsie began a more westerly track into the South China Sea. As the typhoon entered the South China Sea (Fig. 4-21), it began to weaken with inflow restricted to the north by the Asian continent. Still, the Royal Observatory, Hong Kong, reported that typhoon Elsie was one of the most intense typhoons ever to affect Hong Kong in the month of October. Royal Observatory radar began tracking the storm by late afternoon on the 13th and Elsie passed 35 nm to the south of Hong Kong on the 14th. At that time the maximum sustained winds recorded at Hong Kong were 70 kt with gusts up to 118 kt. Fortunately, the maximum winds occured at a low tide, thus reducing flooding. Seven ocean going vessels drifted from their moorings and one small craft and a fishing junk capsized. The lowest pressure recorded in Hong Kong was 987.5 mb. There were no fatalities reported, but 46 people were injured by flying debris.

After passing south of Hong Kong, Elsie continued westward, making landfall on the southern China coast at approximately 1500Z on the 14th. Elsie then dissipated rapidly over the Asian mainland.

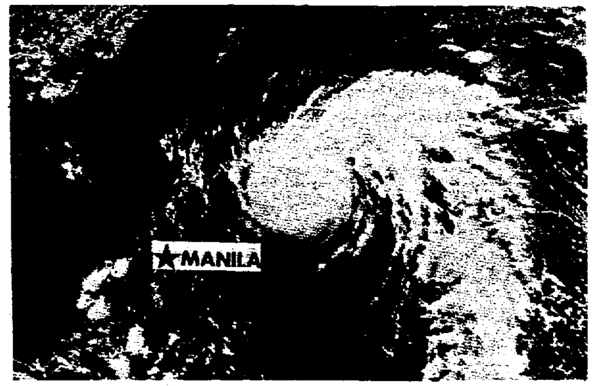


FIGURE 4-20. *Typhoon Elsie beginning explosive deepening some 420 nm northeast of Manila, 11 October 1975, 0348Z. (DMSP imagery)*

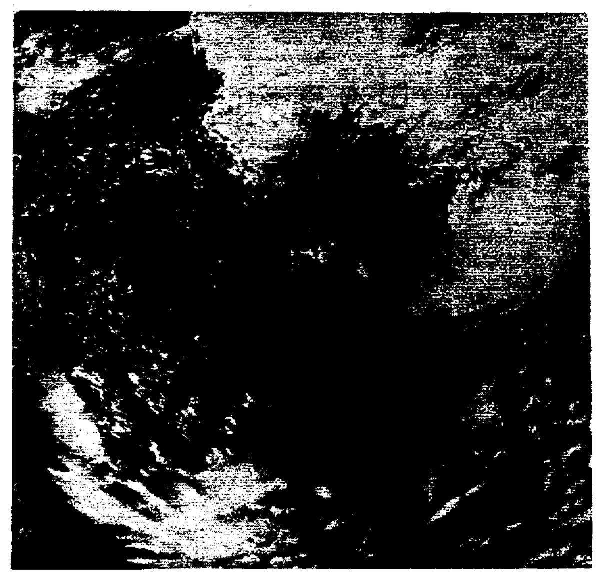
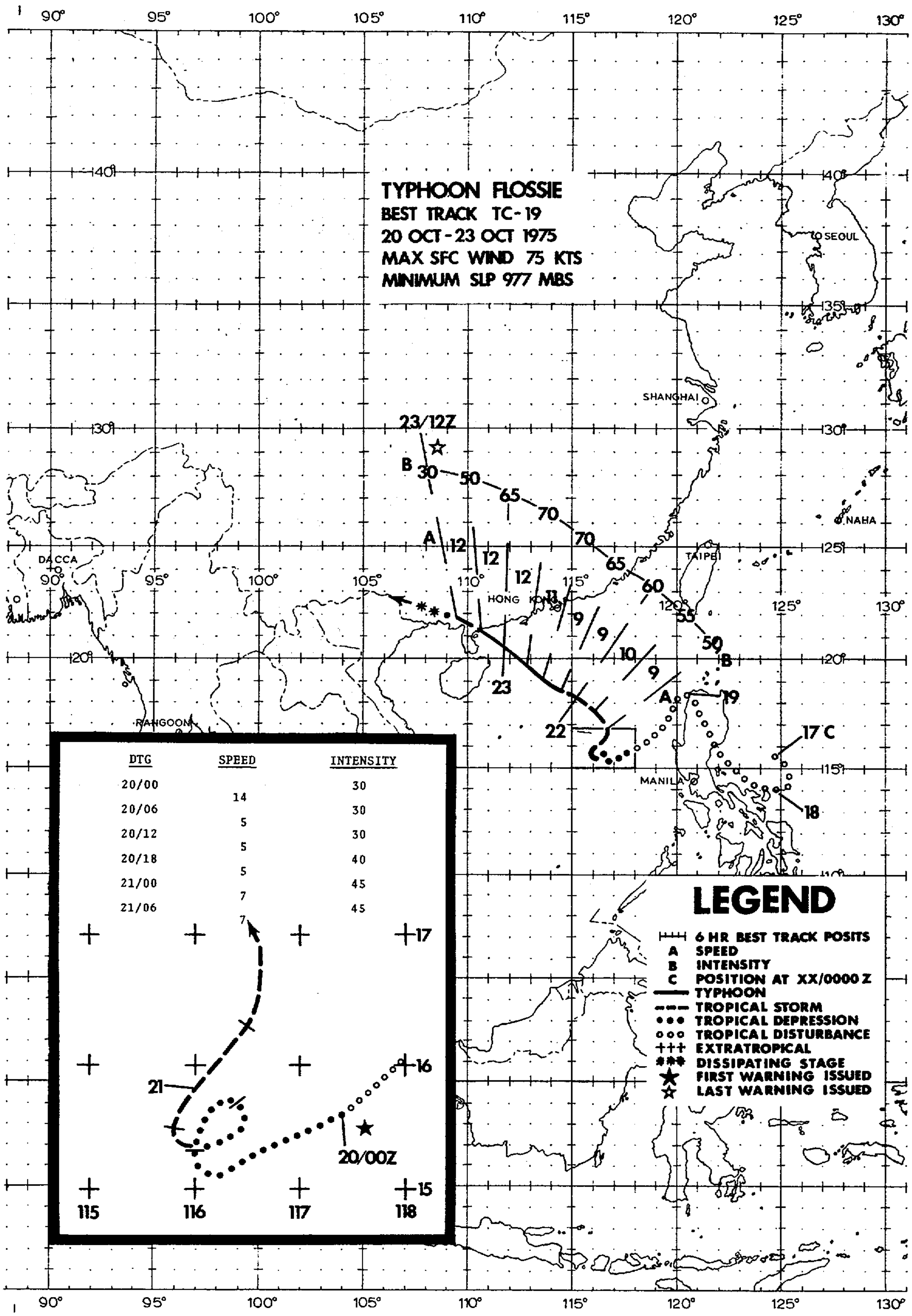


FIGURE 4-21. *Typhoon Elsie entering the South China Sea 260 nm east of Hong Kong, 13 October 1975, 0452Z. (DMSP imagery)*



TYPHOON FLOSSIE
BEST TRACK TC-19
20 OCT - 23 OCT 1975
MAX SFC WIND 75 KTS
MINIMUM SLP 977 MBS
90° 95° 100° 105° 110° 115° 120° 125° 130°
40° 35° 30° 25° 20° 15° 10°
SEOUL
SHANGHAI
NAHA
TAIPEI
HONG KONG
DACCA
RANGOON
MANILA
23/12Z
17 C
18
19
22
23
21
20/00Z
DTG SPEED INTENSITY
20/00 30
14
20/06 30
5
20/12 30
5
20/18 40
5
21/00 45
7
21/06 45
7
115 116 117 118
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED

The circulation which was to become Typhoon Flossie was first analyzed 500 nm west-southwest of Guam on the 0000Z surface analysis of 14 October. This disturbance, apparently initiated by an upper tropospheric cyclone, then began drifting west. Its development was somewhat retarded on the 15th and 16th by the presence of T.D. 18 420 nm to the north-northeast. On the 19th the disturbance moved into the South China Sea after crossing Luzon and began to intensify.

The first warning was issued on the morning of the 20th based on satellite and synoptic data. Early the next morning reconnaissance aircraft reported a central pressure of 989 mb and T.D. 19 was upgraded to Tropical Storm Flossie.

Mid-tropospheric ridging extending from the central North Pacific to the northern portion of the South China Sea was the controlling factor in steering Flossie. A weakness developed in this ridge during the next few days, producing extremely weak steering flow. This caused the storm to follow an erratic track during the period from 200000Z to 211200Z (Fig. 4-22).

A container ship, the SS Mayaquez, reported a pressure of 980 mb and 60 kt winds on the afternoon of the 21st. At that time the Mayaquez was 40 nm south-southwest of the storm center. Flossie was upgraded to typhoon on the afternoon of the 22nd when located about 250 nm south of Hong Kong. Two timber freighters, the Ming Sing and Kinabalu Satu, sunk between Flossie and the southern approaches to Hong Kong on the 21st and 22nd, respectively. Due to the high seas and typhoon force winds, all rescue efforts failed and a total of 44 men were lost. Three survivors were picked up in a life boat a week later.

Flossie reached a maximum intensity of 70 kt on the evening of the 22nd. By the 23rd, the mid-tropospheric ridging was reestablished, and Flossie tracked northwest in the expected climatological direction for this area and time of year. As the typhoon approached landfall on the 23rd, its circulation was disrupted in the northeast quadrant by the terrain and its intensity began to diminish rapidly. Flossie made landfall on the afternoon of the 23rd on the northeast portion of the Luichow Peninsula (Fig. 4-23). Winds at that time were down to 50 kt.

Although Typhoon Flossie's maximum winds were only 70 kt, the seas generated in the northern South China Sea remained a threat to shipping for several days.

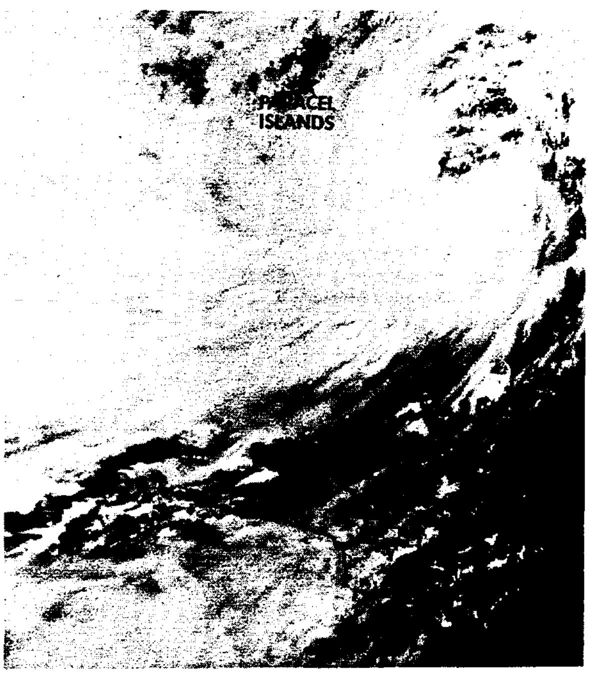


FIGURE 4-22. *Flossie as a 45 kt tropical storm approximately 225 nm east-southeast of the Paracel Islands, 21 October 1975, 0032Z. (DMSP imagery)*

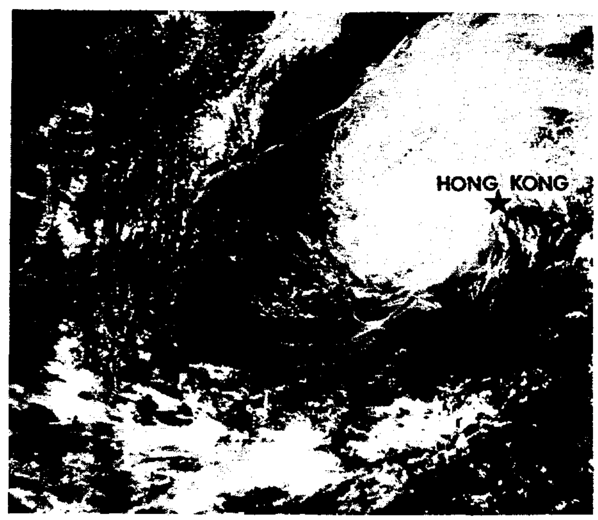
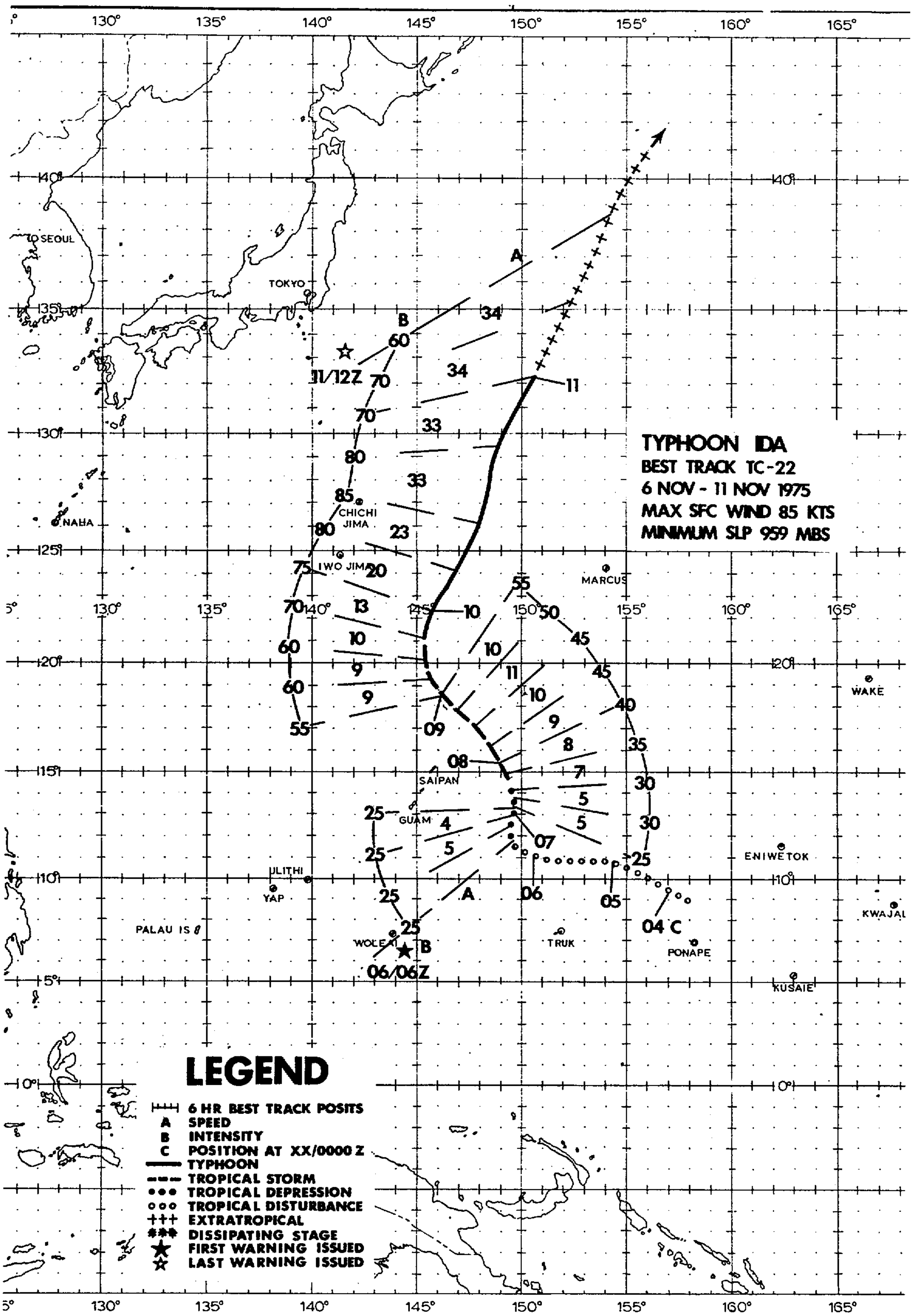


FIGURE 4-23. *Flossie just prior to making landfall on Luichow Peninsula some 200 nm west-southwest of Hong Kong. (DMSP imagery)*


TYPHOON IDA
BEST TRACK TC-22
6 NOV - 11 NOV 1975
MAX SFC WIND 85 KTS
MINIMUM SLP 959 MBS
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SEOUL
TOKYO
NAHA
CHICHI JIMA
IWO JIMA
MARCUS
WAKE
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
WOLEAI
TRUK
PONAPE
ENIWETOK
KWAJAL
KUSAIE
11/12Z
06/06Z

Destined to spend its entire life cycle at sea, Typhoon Ida was first observed as a tropical disturbance on the 4th of November, 150 nm northwest of Ponape. The disturbance initially tracked westward at 8 kt with dual circulation centers oriented along a northeast to southwest axis. The disturbance became a tropical depression at 0600Z on the 6th and then began moving toward the north through a weakness in the mid-tropospheric subtropical ridge. The depression continued to move north at 4-5 kt for the next 24 hr while the two circulation centers consolidated into one.

Early on the morning of the 8th, the depression was upgraded to Tropical Storm Ida (Fig. 4-24) and it accelerated toward the northwest at 10 kt. Ida continued to intensify as the center passed near the Southern Mariana Islands, with wind gusts of 32 kt reported on Guam on the 7th. On the 9th Pagan Island in the Northern Marianas reported 40 kt winds.

By the 9th, Ida came under the influence of a deep mid-latitude trough centered 600 nm to the west and began to recurve. The storm attained typhoon intensity (Fig. 4-25) by 1800Z on the 9th and began tracking toward the north-northeast at an accelerated rate. A minimum central pressure of 959 mb was observed by aircraft reconnaissance at 1437Z on the 10th. By 0000Z on the 11th, Ida was moving toward the north-northeast at 33 kt and had lost much of her tropical cyclone characteristics as evidenced by satellite data (Fig. 4-26). Twelve hours later, Ida had combined with a frontal system and continued to move rapidly northeastward as an extratropical system.

FIGURE 4-25. *Typhoon Ida near 75 kt during recurvature 420 nm north of Saipan, 9 November 1975, 2329Z. (DMSP imagery)*

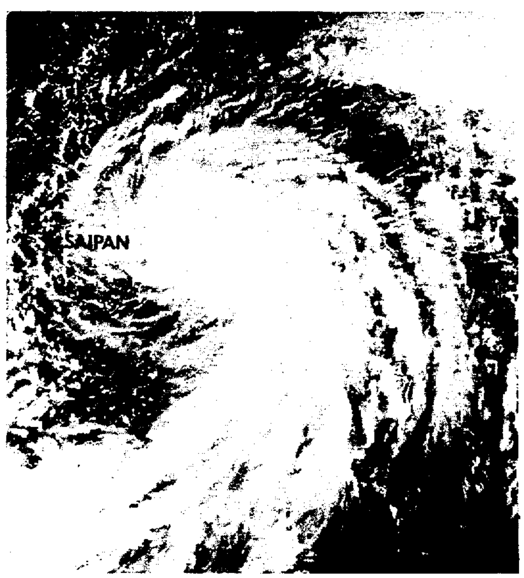


FIGURE 4-24. *Ida just prior to achieving tropical storm intensity 255 nm east-northeast of Guam, 7 November 1975, 2224Z. (DMSP imagery)*

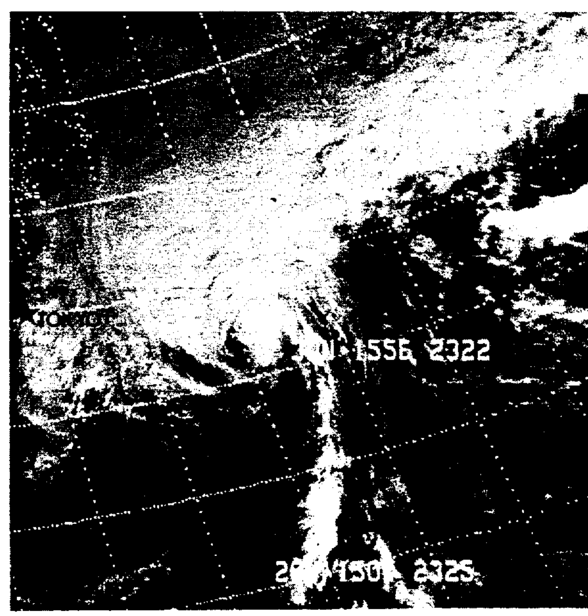
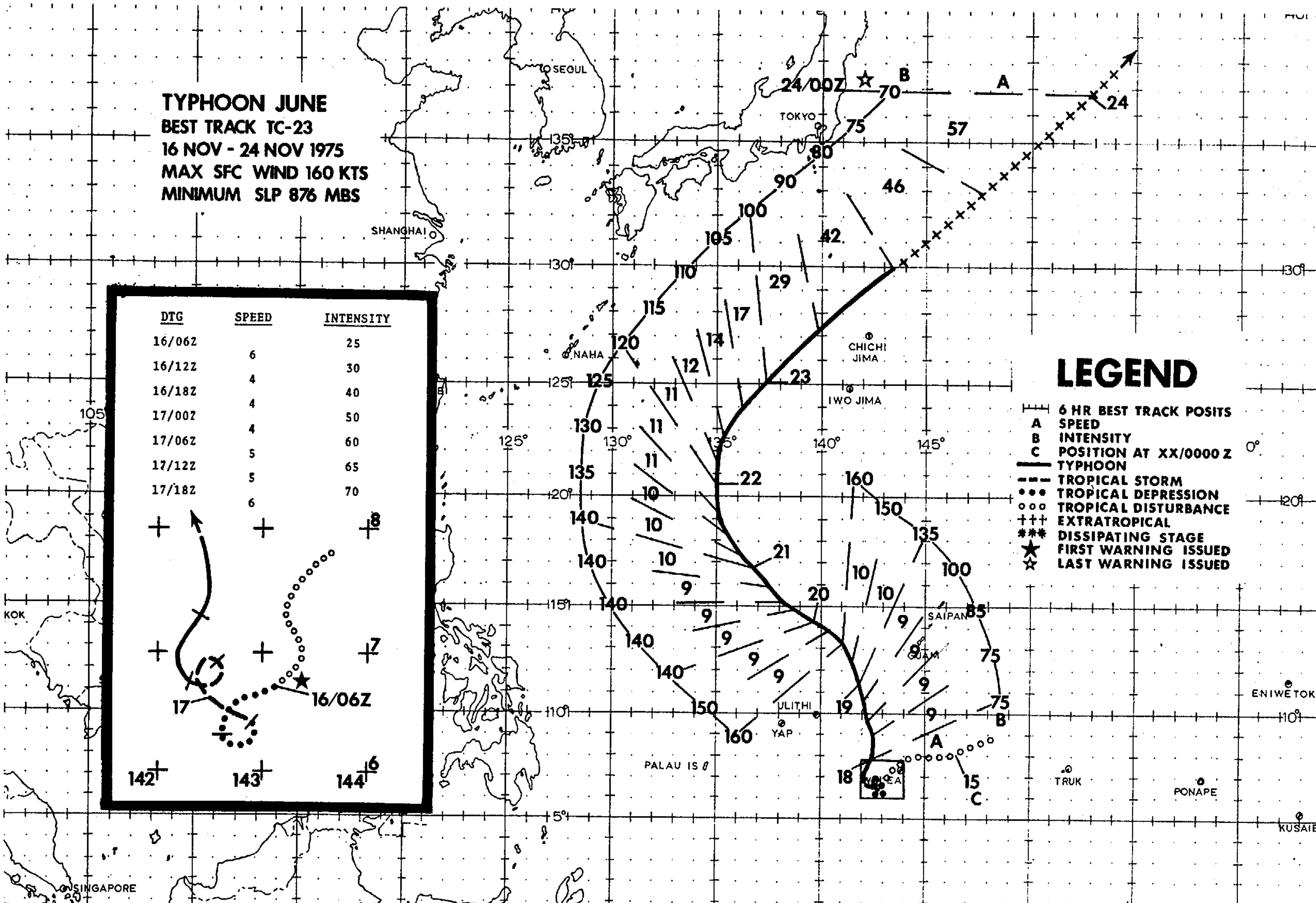


FIGURE 4-26. *Typhoon Ida becoming extra-tropical 575 nm east-southeast of Tokyo, 10 November 1975, 2321Z. (NOAA-4 imagery)*


TYPHOON JUNE
BEST TRACK TC-23
16 NOV - 24 NOV 1975
MAX SFC WIND 160 KTS
MINIMUM SLP 876 MBS
DTG SPEED INTENSITY
16/06Z 25
6
16/12Z 30
4
16/18Z 40
4
17/00Z 50
4
17/06Z 60
5
17/12Z 65
5
17/18Z 70
6
16/06Z
17
LEGEND
6 HR BEST TRACK POSITS
A SPEED
B INTENSITY
C POSITION AT XX/0000 Z
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
FIRST WARNING ISSUED
LAST WARNING ISSUED
SEOUL
TOKYO
SHANGHAI
NAHA
CHICHI JIMA
IWO JIMA
SAIPAN
GUAM
ULITHI
YAP
PALAU IS
TRUK
PONAPE
ENIWETOK
KUSAIE
SINGAPORE
24/00Z
24
23
22
21
20
19
18
15

The last typhoon of the year was to become the most intense on record. At 0843Z on 19 November, reconnaissance aircraft measured a record low 700 mb height of 1984 m while traversing the eye and obtained a coincident minimum sea level pressure (MSLP) of 876 mb (25.87 in) by dropsonde near the cloud wall. This observation was the lowest on record, slightly lower (1 mb) than Typhoons Ida in 1958 and Nora in 1973. June's central pressure well surpasses the lowest Western Hemisphere reading (892.3 mb), and that obtained by aircraft in Hurricane Camille (905 mb).

June had been under frequent surveillance by satellite and aircraft since her birth in the central Carolines on the 16th. Initially, the system moved slowly westward, becoming quasi-stationary near 6N 143E (445 nm south of Guam), the result of weak steering flow near the equator (Fig. 4-27).

On the 18th, June began to move northward, perhaps in response to a weakness in the 500 mb ridge caused by a deep trough approaching from the west. Simultaneously, June began to rapidly deepen, her surface pressure plummeting 52 mb in 11 hr and 90 mb in 24 hr. By the 19th, the winds of Super Typhoon June had increased to an estimated 160 kt as the typhoon reached its lowest pressure, some 230 nm west-southwest of Guam (Fig. 4-28). As June tracked north-northwest toward a weakness in the 500 mb ridge, the system reached exceptionally large proporations. Sustained

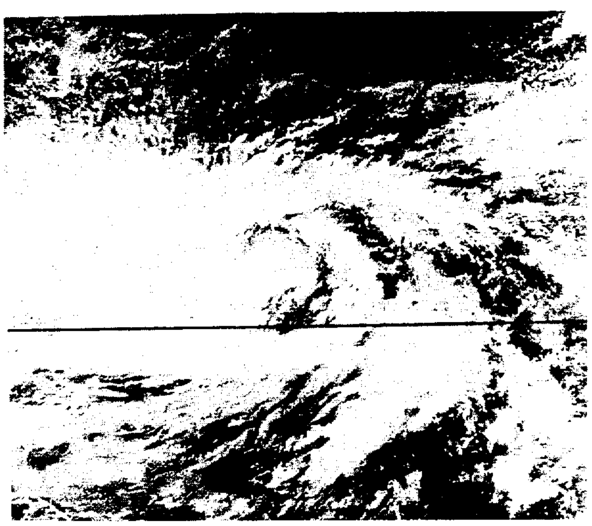


FIGURE 4-27. *June at tropical storm intensity 420 nm south-southwest of Guam, 16 November 1975, 2302Z. (DMSP imagery)*

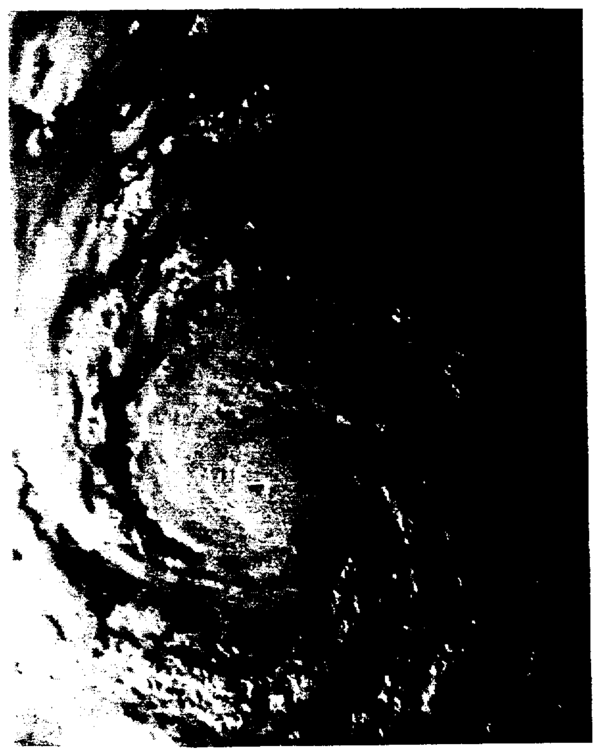


FIGURE 4-28. *Super Typhoon June near 160 kt peak intensity 210 nm west of Guam. Lightening discharge can be seen across the eye of the moonlight photograph, 19 November 1975, 1002Z. (DMSP imagery)*

surface winds of 50 kt or greater extended 200 nm outward from the center.

On the evening of the 19th; June passed approximately 200 nm to the west of Guam. More than 3,200 island residents fled into evacuation centers. There was severe flooding in low-lying areas, with several buildings and homes damaged or destroyed by gale force winds and storm surge. A peak gust of 70 kt was recorded at Andersen AFB. Island losses amounted to an estimated $300,000 with most of the damage to crops.

Eauripik Atoll in Yap district suffered severe property and crop damage. Newspaper reports stated that "sizable portions" of the island were washed away by the heavy seas, but that no deaths or injuries occurred. Flooding and crop damage were also reported on Woleai Atoll and on other low-lying islands in Yap district; however, no casulaties were reported on any of the islands.

After passing abeam of Guam, Super Typhoon June turned northwest (Fig. 4-29). On the 22nd, June began recurving toward the northeast with maximum winds down to 100 kt. On the 23rd (Fig. 4-30), the storm began accelerating rapidly in the strong westerlies and its forward speed reached nearly 60 kt. With an influx of cold air, June became extratropical above 30N, still possessing winds of typhoon intensity.

FIGURE 4-29. *Super Typhoon June at 145 kt heading to the northwest away from Guam, 19 November 1975, 2348Z. (DMSP imagery)*

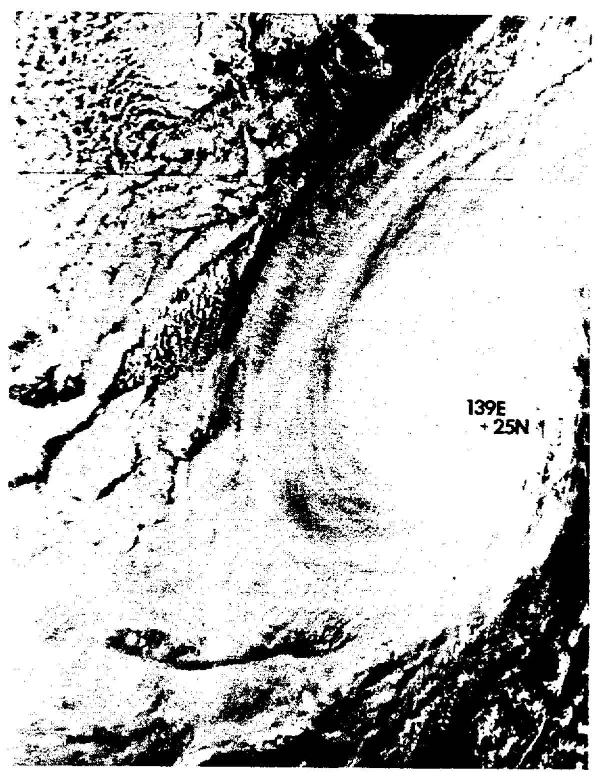
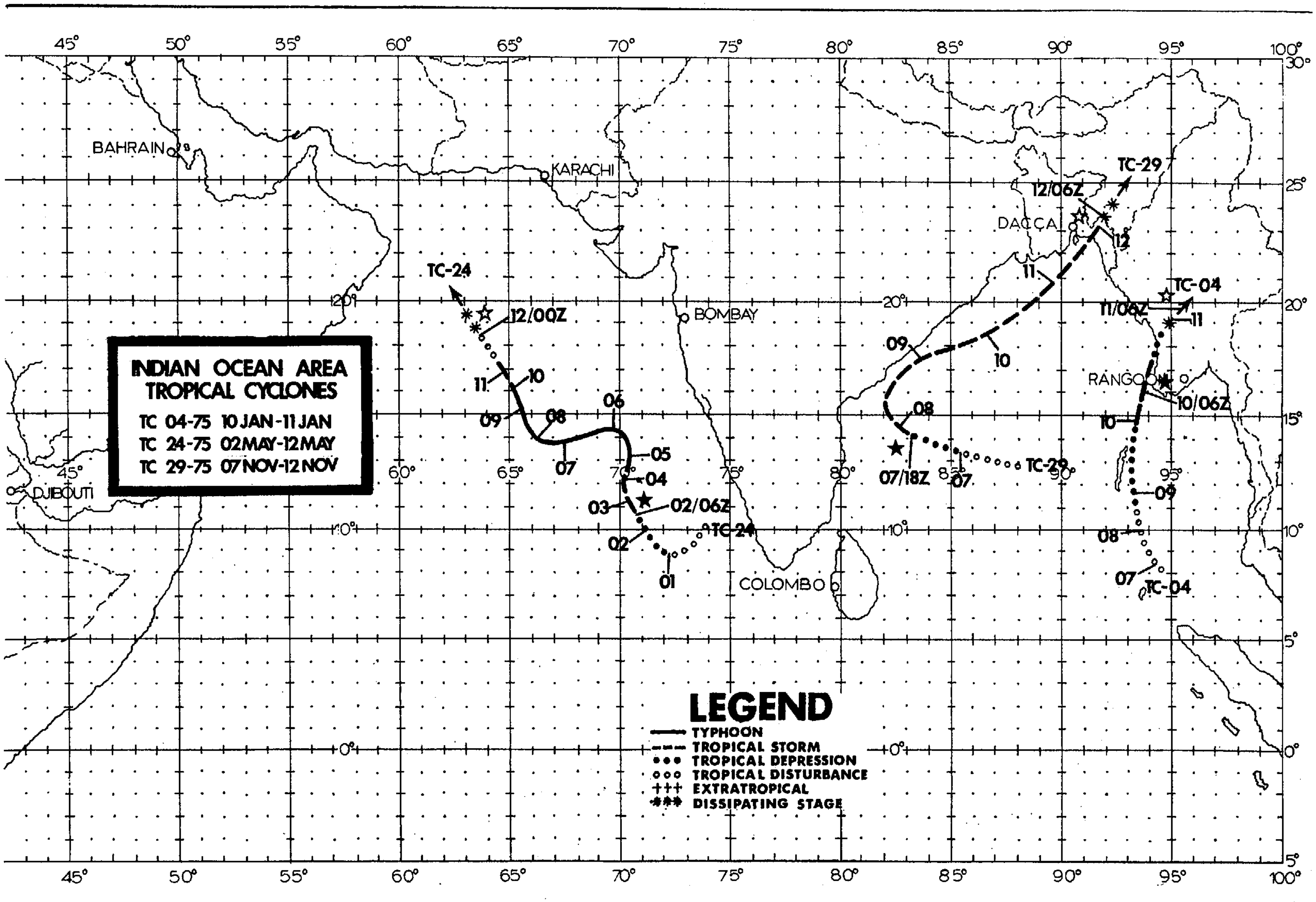
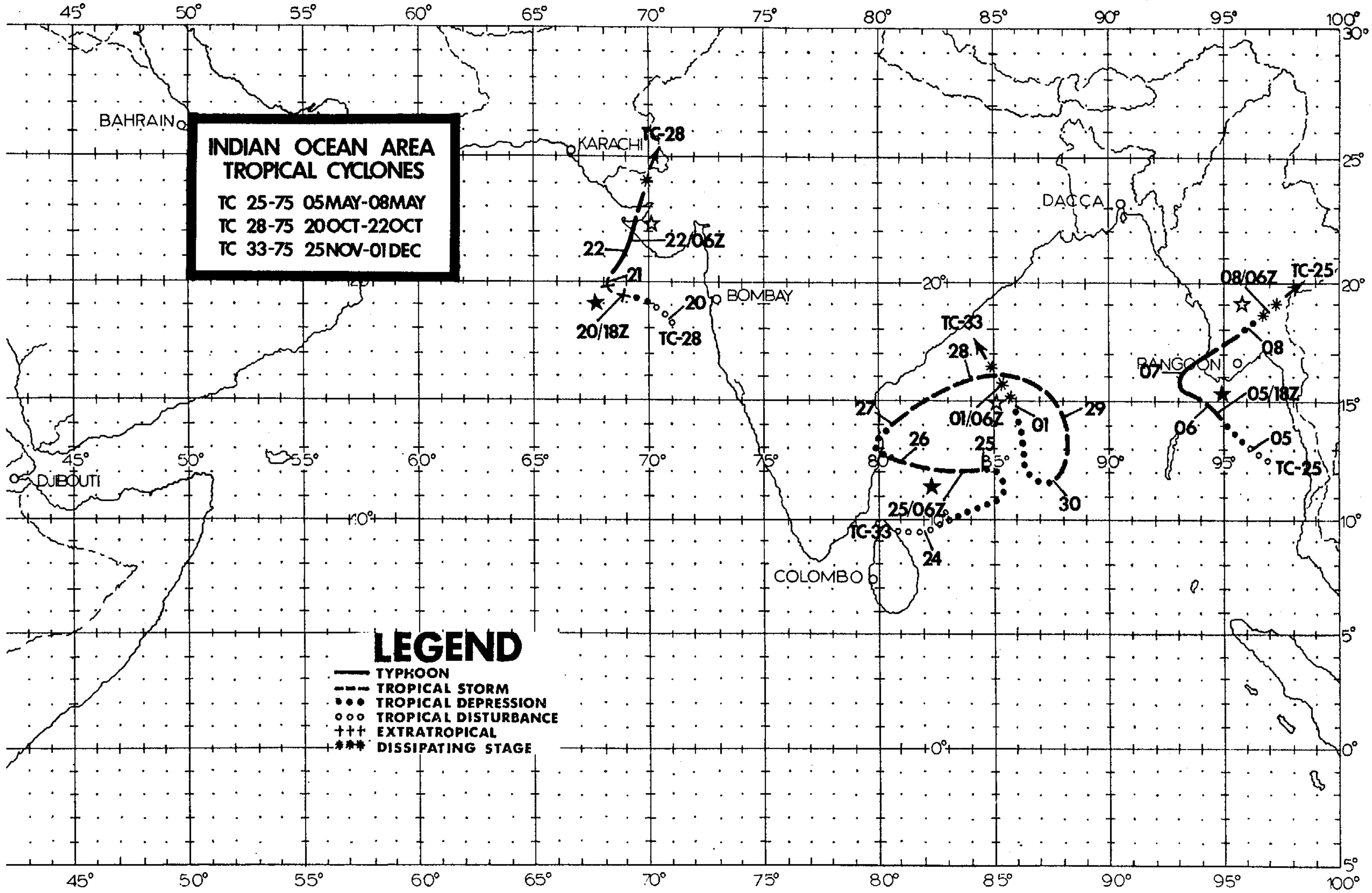


FIGURE 4-30. *June maintaining 100 kt winds as she accelerates after recurvature, 22 November 1975, 2252Z. (DMSP imagery)*


INDIAN OCEAN AREA
TROPICAL CYCLONES
TC 04-75 10 JAN-11 JAN
TC 24-75 02 MAY-12 MAY
TC 29-75 07 NOV-12 NOV
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
BAHRAIN
KARACHI
BOMBAY
DJIBOUTI
COLOMBO
DACCA
RANGOON
TC-24
12/00Z
02/06Z
TC-29
12/06Z
07/18Z
TC-04
11/06Z
10/06Z


INDIAN OCEAN AREA
TROPICAL CYCLONES
TC 25-75 05MAY-08MAY
TC 28-75 20OCT-22OCT
TC 33-75 25NOV-01DEC
LEGEND
TYPHOON
TROPICAL STORM
TROPICAL DEPRESSION
TROPICAL DISTURBANCE
EXTRATROPICAL
DISSIPATING STAGE
BAHRAIN
KARACHI
DACCA
BOMBAY
RANGOON
DJIBOUTI
COLOMBO
TC-28
22/06Z
22
21
20
20/18Z
TC-33
28
27
26
25
24
25/06Z
01/06Z
01
29
30
TC-25
08/06Z
08
07
06
05/18Z
05
45°
50°
55°
60°
65°
70°
75°
80°
85°
90°
95°
100°
30°
25°
20°
15°
10°
5°
0°

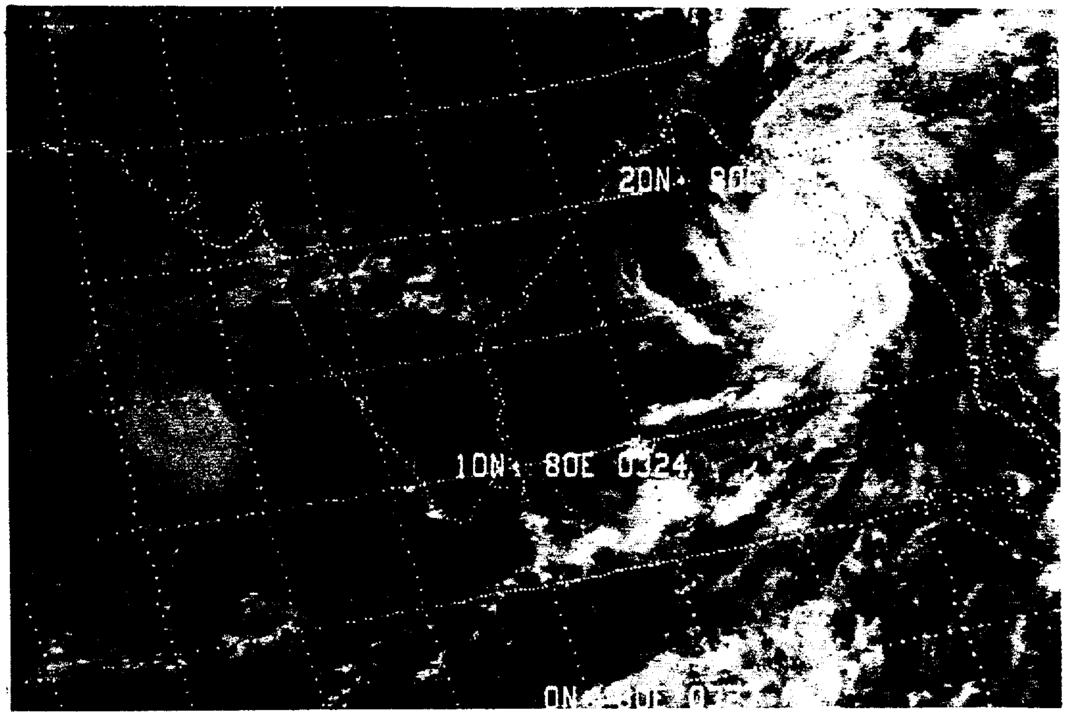


FIGURE 4-31. *Tropical cyclones 24-75 (Arabian Sea) and 25-75 (Bay of Bengal), 7 May 1975, 0322Z. T.C. 24-75, near 75 kt, is some 450 nm southwest of Bombay. T.C. 25-75, near its 75 kt peak intensity, is 65 nm west of the Burma coast. (NOAA-4 imagery)*

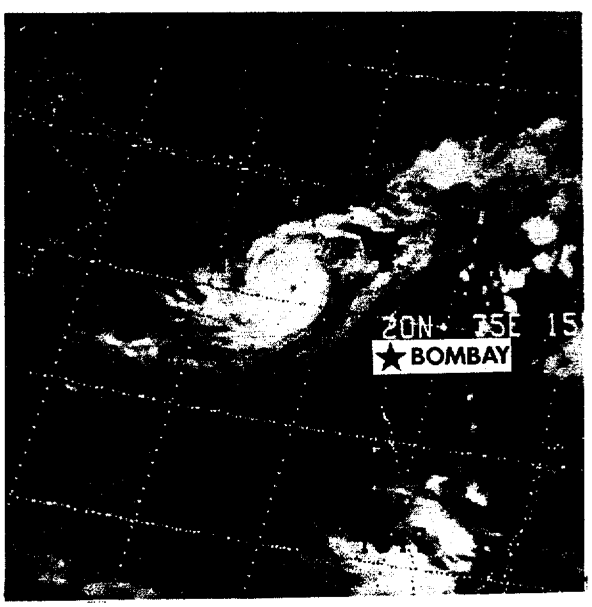


FIGURE 4-32. *Infrared imagery of Tropical Cyclone 28-75 near 65 kt some 270 nm west-northwest of Bombay, 21 October 1975, 1550Z. (NOAA-4 imagery)*

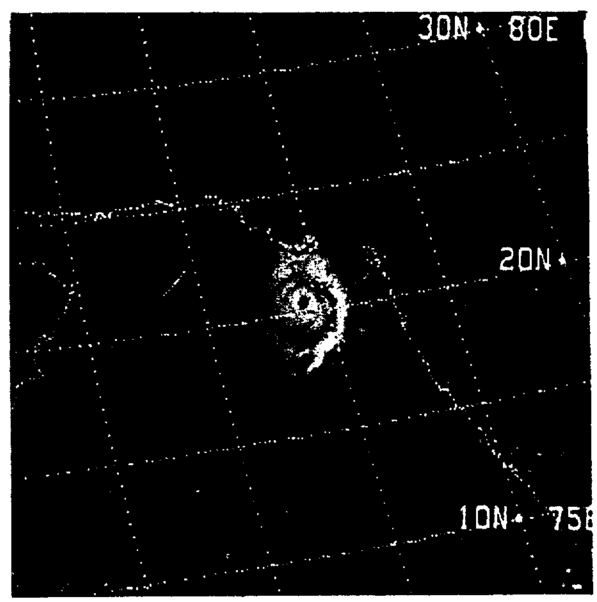


FIGURE 4-33. *Tropical Cyclone 28-75 at 80 kt peak intensity some 40 nm south-southwest of landfall on northwestern India, 22 October 1975, 0404Z. (NOAA-4 imagery)*

5. TROPICAL CYCLONE CENTER FIX DATA

Fix data for 197~~5~~6 will be published in a separate Technical Note. This Tech Note will include fix data for all storms in the PACOM area west of 140W and north of the equator. To obtain a copy of this report write:

Commanding Officer
Fleet Weather Central/JTWC
COMNAVMARIANAS Box 12
FPO San Francisco 96630

A computation of closest distance to the best track (right angle error) is also calculated. Right angle error, graphically depicted in Figure 5-2, is a measure of ability to forecast the path of motion without regard to speed.